Cave and burrow crickets of the subfamily Bothriophylacinae (Orthoptera: Myrmecophilidae) in Iran and adjacent countries

Пещерные и норные сверчки подсемейства Bothriophylacinae (Orthoptera: Myrmecophilidae) в Иране и соседних странах

M.S. Tahami, A.V. Gorochov* & S. Sadeghi*

М.С. Тахами, А.В. Горохов, С. Садеги

M. Tahami & S. Sadeghi, Entomology Laboratory, Biology Department, College of Science, Shiraz University, Shiraz, Iran. E-mail: tahami.m@hotmail.com, ssadeghi@shirazu.ac.ir

A.V. Gorochov, Zoological Institute, Russian Academy of Sciences, 1 Universitetskaya Emb., St Petersburg 199034, Russia. E-mail: orthopt@zin.ru

The composition, distribution, morphology and bionomics of the cricket subfamily Bothriophylacinae are briefly discussed. The following taxa are described and redescribed on the base of type material: Microbothriophylacini Gorochov **trib. nov.**; *Eremogryllodes iranicus* Tahami et Gorochov **sp. nov.**, *E. persicus* Tahami et Gorochov **sp. nov.**, *E. p. torangae* Tahami et Gorochov **subsp. nov.**, *E. p. lari* Tahami et Gorochov **subsp. nov.**, *E. dilutus* Tahami et Gorochov **sp. nov.**, *E. d. bakhtiyari* Tahami et Gorochov **subsp. nov.** and *E. bifurcatus* Tahami et Gorochov **sp. nov.** from Iran; *E. b. turcicus* Gorochov et Ünal **subsp. nov.** from Turkey; *E. major* Chopard from Afghanistan; *E. monodi* Chopard from North Africa; *Bothriophylax kiritshenkoi* Gorochov et Tahami **sp. nov.**; *B.? richteri* Chopard from Iran; and *B. rjabovi* Gorochov **sp. nov.** from Armenia. Key to tribes and genera of Bothriophylacinae is also prepared.

Кратко рассмотрены состав, распространение, строение и образ жизни сверчковых подсемейства Bothriophylacinae. Описаны и переописаны по типовому материалу следующие таксоны: Microbothriophylacini Gorochov **trib. nov.**; *Eremogryllodes iranicus* Tahami et Gorochov **sp. nov.**, *E. persicus* Tahami et Gorochov **sp. nov.**, *E. p. torangae* Tahami et Gorochov **subsp. nov.**, *E. p. lari* Tahami et Gorochov **subsp. nov.**, *E. dilutus* Tahami et Gorochov **sp. nov.**, *E. d. bakhtiyari* Tahami et Gorochov **subsp. nov.** и *E. bifurcatus* Tahami et Gorochov **sp. nov.** из Ирана; *E. b. turcicus* Gorochov et Ünal **subsp. nov.** из Турции; *E. major* Chopard из Афганистана; *E. monodi* Chopard из Северной Африки; *Bothriophylax kiritshenkoi* Gorochov et Tahami **sp. nov.** и *B.? richteri* Chopard из Ирана; *B. rjabovi* Gorochov **sp. nov.** из Армении. Составлена также определительная таблицы для триб и родов Bothriophylacinae.

Key words: crickets, taxonomy, Iran and adjacent countries, Orthoptera, Myrmecophilidae, Bothriophylacinae, new taxa

Ключевые слова: сверчковые, таксономия, Иран и соседние страны, Orthoptera, Myrmecophilidae, Bothriophylacinae, новые таксоны

INTRODUCTION

The subfamily Bothriophylacinae Miram, 1934 includes small and completely apterous crickets living in burrows of rodents and reptiles or in caves in the arid territories of North Africa as well as of Southwest and Central Asia. This subfamily was discovered almost at the same time by two entomologists: French orthopterist L. Chopard (1929) described the genus *Eremogryllodes* with two new species from North Africa, and he placed it in the family Gryllidae Laicharting, 1781 between

* *Corresponding authors*

Gryllomorphinae Saussure, 1877 ("Gryllomorphes") and Phalangopsinae Blanchard, 1845; Russian orthopterist E. Miram (1930) described the subfamily Philobothriinae (also in Gryllidae) for the one new genus, *Philobothrium*, with two new species from Turkmenistan, but soon she (Miram, 1934) changed these supraspecies taxa names for Bothriophylacinae and *Bothriophylax* in connection with the homonymy of her original generic name to *Philobothrium* Beneden, 1849 (Platyhelminthes). In the same year, Miram's supraspecies taxa names were provisionally synonymised to Gryllinae (!) and *Eremogryllodes*, respectively (Chopard, 1934); later the latter author confirmed this generic synonymy and placed his *Eremogryllodes* between Mogoplistinae Brunner von Wattenwyl, 1873 and Myrmecophilinae Saussure, 1874 (Chopard, 1948) as well as described five additional species from Arabian Peninsula, Iran, Afghanistan and Israel (Chopard, 1948, 1959, 1960, 1963). Then Chopard (1968) put his *Eremogryllodes* in the tribe Bothriophylacini and included this tribe in Mogoplistinae, possibly based on the very superficial similarity of these small and non-flying crickets, and La Greca (1969) described the another new species of *Eremogryllodes* from Libya without any mention about systematic position of this genus.

The morphological features of Bothriophylacinae were studied in details and compared with those of Myrmecophilinae and other subfamilies of Grylloidea by Gorochov (1980). This study showed that Bothriophylacinae is most related to the subfamily Myrmecophilinae and may be considered as a tribe inside Myrmecophilinae; *Bothriophylax* was removed from synonymy and considered as a subgenus of *Eremogryllodes*. In the paper on higher taxonomy of Grylloidea, Gorochov (1984a) grounded the division of this superfamily into four recent families having independent development of the sclerotised male genital apparatus (see also Gorochov, 2014, 2015): Gryllidae, Mogoplistidae Brunner von Wattenwyl, 1873, Myrmecophilidae Saussure, 1874 and Gryllotalpidae Leach, 1815. In this publication, Bothriophylacinae was included in the Myrmecophilinae as its tribe. Somewhat later, the genus *Microbothriophylax* Gorochov, 1993 was described for one new species from Saudi Arabia, and *Bothriophylax* was restored as a genus (Gorochov, 1993). In the monograph on higher classification and evolution of Ensifera (Gorochov, 1995), the original status of Bothriophylacinae was also restored, and this taxon was considered as a separate subfamily belonging to Myrmecophilidae and most related to Myrmecophilinae. Recently, another new species of *Bothriophylax* has been described from United Arab Emirates (Gorochov, 2017), and numerous specimens of *Eremogryllodes* (including several new species and subspecies) have been collected in different caves of Iran. The work with this material as well as with some older material allowed the authors to better understand the generic position of many species of Bothriophylacinae as well as to find more clear differences between closely related genera in their morphology and lifestyle.

The specimens examined are deposited in the following institutions: Zoological Museum, Collection of Biology Department, Shiraz University, Shiraz, Iran (ZMCBSU); Zoological Institute, Russian Academy of Sciences, St Petersburg (ZIN); Muséum National d'Histoire Naturelle, Paris, France (MNHN); Staatliches Museum für Naturkunde, Stuttgart, Germany (SMNS).

TAXONOMIC PART

Subfamily **BOTHRIOPHYLACINAE** Miram, 1934

Philobothriinae Miram, 1930 (name based on homonymic generic name).

Note. Bothriophylacinae includes three genera: *Eremogryllodes*, *Bothriophylax* Miram, 1934 (= *Philobothrium* Miram, 1930, homonymic name) and *Microbothriophylax*.

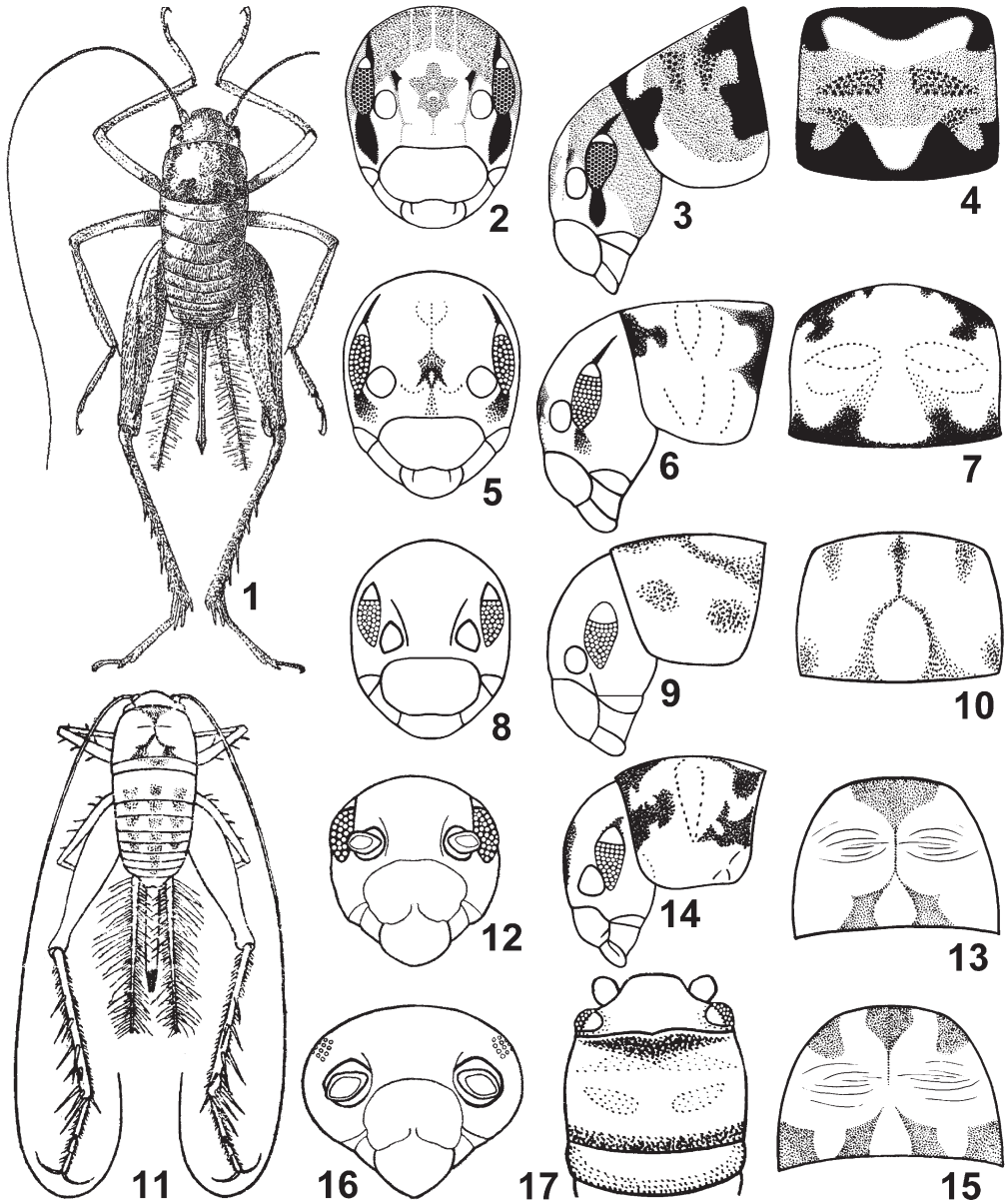
The first two genera are closely related and widely distributed in the arid territories from North Africa to Pakistan; however, they are clearly distinguished from each other by some small but distinct characters of their male genitalia and possibly by their lifestyle. Adult specimens of the third genus (*Microbothriophylax*) are known only from Arabian Peninsula, and habits of this genus are unclear; however, one nymph possibly belonging to this genus was collected in "dark interior of wolf's den" (Chopard, 1948). The external structure of *Microbothriophylax* is more similar to that of the previous genera than to that of *Myrmecophilinae* (Figs I; II: 1, 6), but its hind femora are almost intermediate between these subfamilies (Figs II: 4, 5, 7), and its male genitalia are very different from those of all the other taxa of Myrmecophilidae (Figs III: 1–7, 13–21; IV); thus, this genus must be isolated as a separate tribe of Bothriophylacinae (see a key for tribes and genera of Bothriophylacinae below). Moreover, its male genitalia has a rather primitive structure of the epiphallus and endoparameral apodeme (Figs III: 4–7), whereas *Eremogryllodes* and *Bothriophylax* have these epiphallus and apodeme strongly specialized and very similar to those of the genus *Myrmecophilus* Berthold, 1927 (Figs III: 14–19, 21; IV: 1–3, 10, 13, 20, 23–25, 28). Therefore, we cannot exclude that *Microbothriophylax* is a member of a separate (third) subfamily of Myrmecophilidae; however, its similarity to *Eremogryllodes* and *Bothriophylax* in the general appearance may indicate that it also belongs to Bothriophylacinae, and that the similarity of the latter genera with *Myrmecophilus* in the genital structure is only a convergence or an evidence of the origin of Myrmecophilinae from an advanced representative of Bothriophylacinae (i.e. Bothriophylacinae may be a paraphyletic taxon).

Morphology. The body of Bothriophylacinae is small and light coloured (yellowish or whitish) but often with light brown or brown spots and stripes (Figs I: 1–15, 17; VI; XI). The head is comparatively large and almost semiglobular, with the long antennae having the small scape which is 1.8–2.4 times as wide as the distance between the antennal cavities, with the mouthparts rather small but having the comparatively long maxillary palpi (Figs V: 10; VI: 1) as well as large and moderately convex clypeus (this clypeus is more or less oval, i.e. almost not divided into anteclypeus and postclypeus by distinct lateral notches or any transverse fold), with the eyes elongate (almost vertical) but not large and lacking facets in the dorsoposterior third or quarter (Figs I: 2, 3, 5, 6, 8, 9, 12, 14, 17; VI: 1), and without ocelli. The pronotum is also large, semitubular but wider than long, with the anterior edge somewhat convex, with posterior one more or less straight, with the lateral sides almost parallel, and without any border in the shape of a low and thin submarginal keel which outlines all the pronotal edges in the other groups of Grylloidea (Figs I: 3, 4, 6, 7, 9, 10, 13–15, 17); meso- and metanotum are almost as abdominal tergites in the shape, i.e. clearly transverse but usually longer than the latter tergites; wings are completely absent (Figs I: 1, 11; VI: 4–9; XI: 1, 2, 6, 9); legs are moderately long and thin, with short coxae (Fig. II: 1) and thickened hind femur (Figs II: 4, 5; VI: 2, 3; XI: 4, 12), without tympana on the fore legs, without any armament on the femora and most part of tibiae, but usually with a pair of ventroapical spurs on the fore and middle tibiae, a few long and thin movable spines on the both dorsal keels of hind tibia as well as three pairs of apical spurs on the hind tibia and 1–2 dorsal spinules on the hind basitarsus (Figs II: 1–5). The abdomen is without distinct glands in the both sexes; last abdominal segment is not fused with the epiproct, i.e. not forming an anal (= supraanal) plate; this segment is usually rather small and simple in the shape (Figs III: 8–11), but it is deeply divided into a pair of rather long and angular lobes (having apical spinule) in the male of *Microbothriophylax* (Figs III: 1, 3); epiproct is also usually small and simple

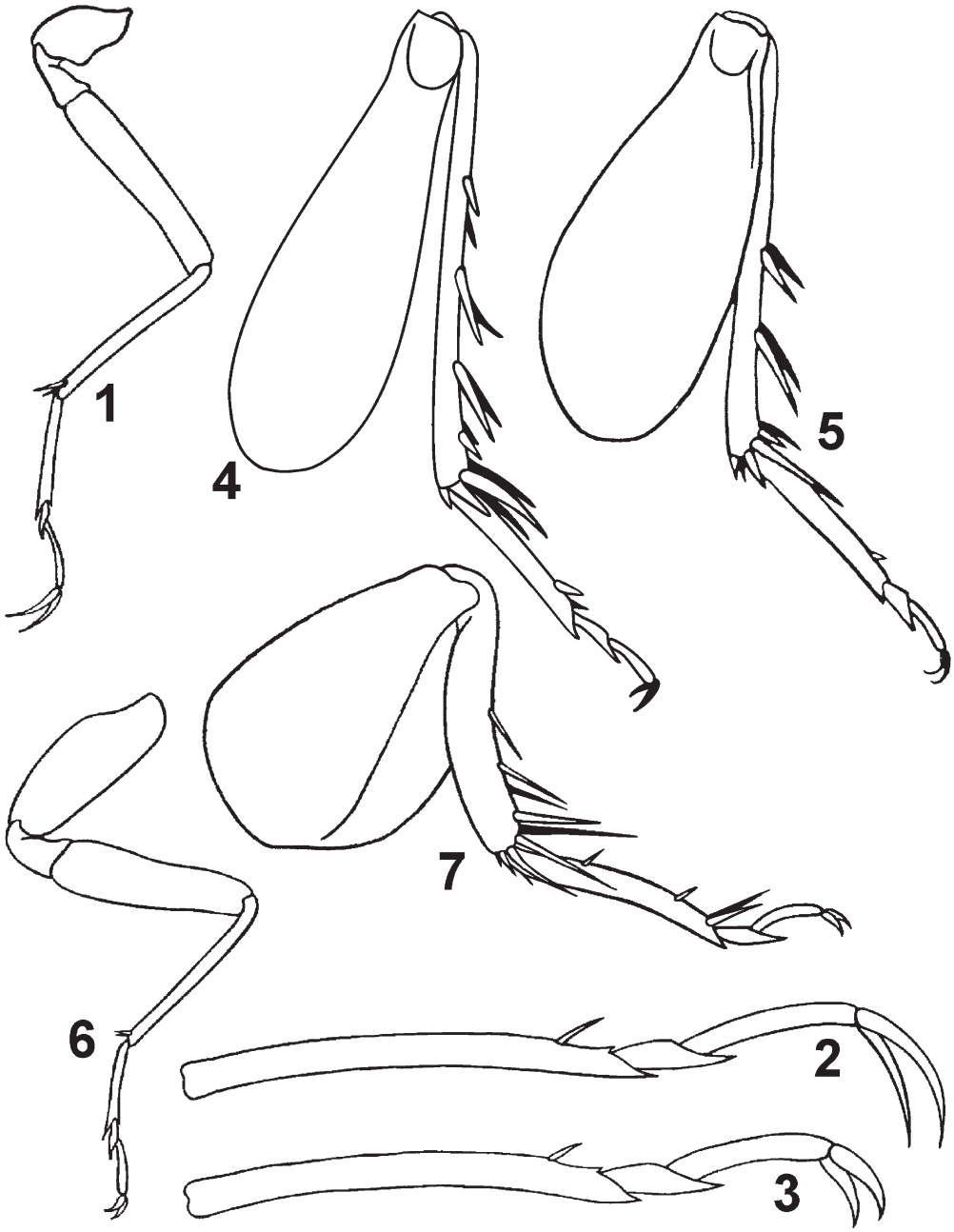
(more or less oval), but in the latter male, it is in the shape of wider membranous fold having a rather small posteromedian notch (Figs III: 1, 3, 8–11); paraprocts are short and rounded, and cerci are thin and rather long (i.e. paraprocts and cerci are unspecialized, typical of Grylloidea); male and female genital (= subgenital) plates are different in the shape; in male, genital plate is rather large, more or less semitubular, usually almost triangular ventrally and with the apical part somewhat specialized (Figs III: 9, 11, 12; VIII: 2–4, 15–17; X: 2–6, 23, 29; XII: 1, 2, 7, 8, 13, 14, 16), sometimes (in *Microbothriophylax*) almost square in the ventral view (Figs III: 2, 3); in female, genital plate is more or less trapezoidal but sometimes with a posteromedian notch (Figs V: 1, 2)

The male genitalia of Bothriophylacinae are very remarkable, strongly different from those of the other families of Grylloidea, but having a certain similarity to those of Myrmecophilinae. Majority of their sclerotized structures are only partly homologous or not homologous to those of the other families. But it is reasonable to use the same genital terms for analogous morphological structures which may have the same origin or the same or similar functions in the formation and transfer of the spermatophore as well as in the female fixation during copulation. Possibly, the unpaired (median) sclerite named "epiphallus" in Myrmecophilidae (Gorochov, 1980) is independently formed from a dorsal part of the former membranous dorsal fold (lobe) characteristic of the general ancestors of Ensifera as well as of Grylloidea, and thus it is partly homologous to the epiphallus of Gryllidae and some other orthopterans; in Bothriophylacinae and Myrmecophilinae, this sclerite is always firmly articulated with the special ventral projections of ninth and tenth abdominal tergites (Figs III: 5, 13, 15, 17), but in the other families of Grylloidea, the epiphallus is distinctly isolated from these tergites by membranous areas. In Myrmecophilidae, the epiphallus is also with a large unpaired (median) apodeme which is directed forwards and penetrates deeply into the body cavity (Figs III: 4–7, 14–16, 21; IV: 1, 2, 23, 24); but in Gryllidae, Mogoplistidae and Gryllotalpidae, the epiphallus usually has a pair of rather small apodemes. The epiphallus of *Microbothriophylax* is completely sclerotized, rather long and more or less triangular dorsally; it is strongly projected behind the paraprocts, and its apodeme is also completely sclerotized and not longer than the main epiphallic part (Figs III: 1–7); however, the epiphallus in *Eremogryllodes*, *Bothriophylax* and *Myrmecophilus* is divided by a moderately large or very large membranous area into two lateral parts which often consist of a pair of small posterior sclerites (barely projected or not projected behind the paraprocts) and a pair of thin and semisclerotized lateral ribbons corresponding to the lateral parts of the median epiphallic apodeme of *Microbothriophylax* (Figs III: 14–16, 21; IV: 1, 2, 23, 24).

In the latter genus, there is an additional unpaired (median) sclerite located under the epiphallus (Fig. III: 7). It is also almost triangular but smaller and having a pair of very long and rather thin apodemes (Figs III: 4–6) which are undoubtedly homologous to the endoparameral apodemes of Gryllidae (endoparameral apodeme = apodema principale in the other families and superfamilies of the Ensifera; Gorochov, 2015). Thus, this sclerite may be named "endoparameral sclerite" (= endoparamere or endoparameron) although it probably arose in Myrmecophilidae independently as a thickened part of the genital membrane for attaching these apodemes and is incompletely homologous to the usually paired endoparameres of the Gryllidae. In *Eremogryllodes*, *Bothriophylax* and *Myrmecophilus*, there is a pair of endoparameres having a stick-like, plate-like or strongly bifurcated shape and fused with an extremely large unpaired apodeme by their basal (anterior) parts (Figs III: 14, 17–19, 21; IV: 3, 6, 7, 10, 12, 13, 16, 17, 20, 22, 25, 28, 31); the latter apodeme is dorsoventrally lamel-



Figs I (1–17). *Myrmecophilidae*. **1–4**, *Eremogryllodes monodi* Chop.; **5–7**, *E. major* Chop.; **8–10**, *Bothriophylax? richteri* (Chop.); **11–13**, *B. vlasovi* (Mir.); **14, 15**, *B. semenovi* (Mir.); **16**, *Myrmecophilus oculatus* Mir.; **17**, *Microbothriophylax mica* Gor. Body of female from above (1, 11); head without antennae and palpi in front (2, 5, 8), and without these structures (except for scapes) in front and partly from below (12, 16); head without antennae, maxillae and labium but with pronotum from side (3, 6, 9, 14) and from above (17, with scapes); pronotum from above (4, 7, 10, 13, 15). [1, 11, 12, 16, 17, after Chopard (1943), Miram (1930), and Gorochov (1980, 1993)].



Figs II (1–7). **1, 2**, *Bothriophylax vlasovi* (Mir.); **3**, *B. semenovi* (Mir.); **4**, *Eremogryllodes monodi* Chop.; **5**, *Microbothriophylax mica* Gor.; **6, 7**, *Myrmecophilus oculatus* Mir. Fore leg, inner view (1, 6); hind leg without coxa, outer (4, 5) and inner (7) views; hind tarsus, lateral view (2, 3). [2, 5, 7, after Gorochov (1980, 1993), modified].

lar but with an additional high dorsomedian keel in *Eremogryllodes* and *Bothriophylax* (Figs III: 14; IV: 3, 10, 13, 20); homology of this apodeme with the paired endoparameral apodemes of *Microbothriophylax* is not very evident, because no any traces of fusion of the latter paired apodemes with each other. Moreover, the partly membranous endoparameral fold (lobe), located between the epiphallic lobe (= dorsal fold) and the rachis (= guiding rod) in *Microbothriophylax* or between the epiphallus and rachis in the other genera of Myrmecophilidae (epiphallic lobe in the latter genera is possibly combined with the endoparameral lobe into a single membranous fold), has a pair of moderately large and membranous additional lobes named "ectoparameres" by Gorochov (1980, 1993); these lobes are clearly not homologous to the ectoparameres of Gryllidae which often also not homologous to each other in many groups of Gryllidae, but their position and possible functioning as paired and movable structures for fixing the male genitalia or introducing the spermatophore in the female genital cavity allow us to use these terms in all analogous cases. These ectoparameral lobes are located more or less behind the endoparameral sclerite in *Microbothriophylax* (Figs III: 5, 6) and probably use the endoparameral apodemes as ectoparameral ones; but in *Bothriophylax*, *Eremogryllodes* and *Myrmecophilus*, the ectoparameral lobes are situated almost under the endoparameral sclerites (Figs III: 13, 17–19; IV: 25–28, 30, 31) and provided with moderately long ectoparameral apodemes (Figs III: 13, 17–19; IV; 3, 12, 13, 22, 25, 27, 28, 31); in the latter three genera, these apodemes fused with a pair of ventral sclerites located on the ventral surface of endoparameral fold in *Myrmecophilus* (Fig. III: 20) and in the ventral parts of ectoparameral lobes in *Bothriophylax* and *Eremogryllodes* (Figs IV: 3, 13, 27), but the two latter genera are also with a pair of dorsal sclerites located in the dorsal parts of ectoparameral lobes (Figs IV: 3, 13, 26, 28, 31); both pairs of these sclerites are more or less plate-like in *Bothriophylax* (Figs IV: 26–28, 30, 31) and almost hook-like in *Eremogryllodes* (in the latter genus, these sclerites are here named as "dorsal and ventral ectoparameres"; Figs IV: 3–5, 7, 12–15, 17, 22).

The rachis of Myrmecophilidae is perhaps partly homologous to that of Gryllidae and Mogoplistidae; it is in the shape of a narrow sclerotized semitube. In *Microbothriophylax* and *Myrmecophilus*, its basal part is similar to the formula of Gryllidae when this formula is fused with the rachis, or the above-mentioned part is with a pair of small membranous folds, respectively; this part has a rather long median anterior apodeme in *Microbothriophylax* and lacks such apodeme in *Myrmecophilus* (Figs III: 5–7, 20, 21). In *Eremogryllodes* and *Bothriophylax*, the rachis is often more or less twisted in the distal part, and its basal part (formula?) forms a more or less sclerotized ball with an almost spherical cavity inside; this cavity opens posteriorly by an oblique crevice and is connected with a ventral groove of the rachis, and this ball is fused with a pair of stout posteroventral arms of the median endoparameral apodeme (Figs III: 14; IV: 8–11, 18–21, 27–31). It is possible, this ball-like structure forms a spiral-like part of the spermatophore (Fig. V: 3). This spermatophore part looks as a dense tangle and possibly serves as anchor (ancora) for fixation of spermatophore in the female genital cavity; thus, the above-mentioned ball-like structure of genitalia is partly analogous and/or even homologous to the sacculus (= spermatophore sac) in Gryllidae. It is a reason that this name (sacculus) is here used for this characteristic ball-like structure of the male genitalia. Spermatophore of *Microbothriophylax* is unknown, but its part homologous to the spiral-like one may be formed in a cavity between the rachial base (formula?) and valves (Fig. III: 7). The rest spermatophore structures in the other representatives of Bothriophylacinae are the following: a small, rather hard, reddish and semitransparent ampulla attached

to the female between its genital plate and ovipositor base (Figs V: 1–3), and formed in the male genitalia possibly between their valves and rest genital part (Fig. III: 14); whitish semitranspent mass (spermatophylax ?) located around the basal and dorsal parts of ampulla, and well visible even after attaching the spermatophore to the female (Figs V: 1–3); a thin, rather long and whitish tube situated between the above-mentioned ampulla and thickened spiral-like part, and possibly homologous or analogous to the neck (= collum) in Gryllidae (Fig. V: 3); a rather short and thin apical part of the spermatophore probably corresponding to the tube (= tubus) in Gryllidae and possibly formed in the semitubular part of male rachis (Figs III: 14; V: 3).

The ovipositor in Myrmecophilidae is rather uniform in the structure; it is not very long but with a rather large cavity between its valves; the ventral valves are rather narrow and similar to those of Gryllidae and Mogoplistidae in the shape, but dorsal ones are strongly widened (high) but partly lamellar and clearly arcuate in the transverse section; the latter valves are strongly overlapping each other by their lamellar parts (these characters of dorsal valves are additional unique autapomorphies of Myrmecophilidae; Figs V: 4–6); apical part of ovipositor is rather strongly sclerotized, often with small denticles or teeth on the dorsal valves for the soil digging, and slightly separated or almost not separated from the rest of ovipositor (Figs V: 1, 4, 5, 8). In contrast to Myrmecophilinae, the ovipositor of Bothriophylacinae is unable or almost unable to be drawn under the abdomen (for comparison see Figs V: 1, 8, 9); but in the both subfamilies, eighth and ninth abdominal tergites are rather short (narrow in the profile), and their ventral parts are fused and forming a pair of rather thin but sturdy columns articulated with the ovipositor (Fig. V: 7).

Mode of life. Habits of Bothriophylacinae are poorly known. Some representatives of the genus *Bothriophylax* (*B. vlasovi* Miram, 1930, *B. semenovi* Miram, 1930) were collected in burrows of rodents and reptiles in deserts and semideserts (Miram, 1930, 1934; Gorochov, 1988): *B. vlasovi*, having the tarsal claws very long, was collected in sand deserts; *B. semenovi* with the claws distinctly shorter was collected mainly in clayey deserts and semideserts. In the daytimes, these insects sit on the ceiling of burrow (Vlasov & Miram, 1937; Gorochov, 1979) where they may eat roots of desert plants hanging from the ceiling, as well as algae or mushrooms living on these roots, but at night they can migrate between the burrows and perhaps even feed on open soil; their oviposition is probably produced in the burrow walls. All the Iranian specimens of *Eremogryllodes* considered here were collected in caves, and there are also a few literary indications about the discovery of this genus in Afghanistan (*E. major* Chopard, 1960) and Israel (*E. pallidus* Chopard, 1963) also in caves (Chopard, 1960, 1963). Thus, it is very possibly that these genera have different habits: *Bothriophylax* is mainly adapted to life in burrows, but *Eremogryllodes* is represented mostly by inhabitants of caves. The colouration of different representatives of *Eremogryllodes* may be from contrastingly spotted to almost completely light (without any distinct darkenings); for cave ensiferans, the spotted colouration is evidence that the species is a facultative (but not obligatory) inhabitant of caves and that its distribution may be rather wide, the absence of darkenings indicates that it may be an obligatory inhabitant of caves with a narrow (local) area, and the intermediate colouration suggests that the species has intermediate habits and distribution.

Key to the tribes and genera of Bothriophylacinae

1. Hind femur rather strongly thickened, approximately 2.3 times as long as wide (high) (Fig. II: 5). Male genitalia: epiphallus (epiphallic sclerite) and its anteromedian apodeme undivided into a pair of sclerotized parts by any membranous area (Fig. III: 4);

endoparamere (endoparameral sclerite) also undivided into a pair of sclerites, and with a pair of long and thin (ribbon-like) anterior apodemes (Figs III: 4–6); rachis with simple (plate-like) anterior part having rather long anteromedian apodeme (Figs III: 5–7) ..... Tribe **Microbothriophylacini** Gorochov, **trib. nov.** [Composition: only type genus *Microbothriophylax* including type species *M. mica* Gorochov, 1993 (Saudi Arabia) and possibly *Eremogryllodes seurati* Chopard, 1929 and *E. fitzgeraldi* Chopard, 1948 (both described for nymphs from Algeria and "Arabia", respectively; Chopard, 1948).]

– Hind femur slightly or moderately thickened, 2.7–3.6 times as long as wide (high) (Figs I: 1, 11; II: 4). Male genitalia: epiphallus and its anteromedian apodeme divided or partly divided into a pair of sclerotized parts by long membranous area (Figs IV: 1, 23); endoparamere also more or less divided into a pair of thin and bifurcated sclerites which fused or articulated with special projections of very large unpaired endoparameral apodeme (this apodeme very long, wide and with high dorsomedian keel; Figs IV: 3, 6, 10, 12, 13, 16, 20, 22, 25, 28); rachis with strongly modified anterior part which lacking unpaired anterior apodeme and changed into almost ball-shaped and more or less sclerotized sacculus connected with endoparameral apodeme by a pair of sclerotized lateral arms (Figs III: 14; IV: 8–11, 18–21, 27–31). Tribe **Bothriophylacini** 2

2. Male genitalia: each ectoparameral lobe with two elongate hook-like sclerites, dorsal and ventral ectoparameres (Figs IV: 3, 7, 12, 13, 17, 22); anterior half of dorsal ectoparamere consisting of two sclerotized ribbons (Figs IV: 3, 13); posterior (hook-like) part of ventral ectoparamere articulated or slightly separated from rest part (Figs IV: 4, 5, 14, 15); sacculus rather large, with partly membranous lateral sides (Figs IV: 8–11, 18–21) ..... Genus ***Eremogryllodes*** [Composition: type species *E. monodi* Chopard, 1929 (Algeria); *E. major* Chopard, 1960 (Afghanistan); four new species from Iran and Turkey described here; possibly *E. pallidus* Chopard, 1963 (Israel) and *E. fiorii* La Greca, 1969 (Libya).]

– Male genitalia: each ectoparameral lobe with large and more or less triangularly plate-like dorsal sclerite, and with rather small ventral sclerite located at base of this lobe (Figs IV: 26–28, 30, 31); sacculus small (short), with completely sclerotized lateral sides (Figs IV: 27–29, 30, 31) ..... Genus **Bothriophylax** [Composition: type species *Philobothrium vlasovi* Miram, 1930 (Turkmenistan); *Ph. semenovi* Miram, 1930 (Turkmenistan); *B. arab* Gorochov, 2017 (United Arab Emirates); two new species from Iran and Armenia described here; probably *Eremogryllodes uvarovi* Chopard, 1948 ("Arabia") and *E. richteri* Chopard, 1959 (Iran).]

Eremogryllodes iranicus Tahami et Gorochov, **sp. nov.** (Figs V: 1, 2; VI: 1–4; VII: 1–4, 11, 12; VIII: 1–13)

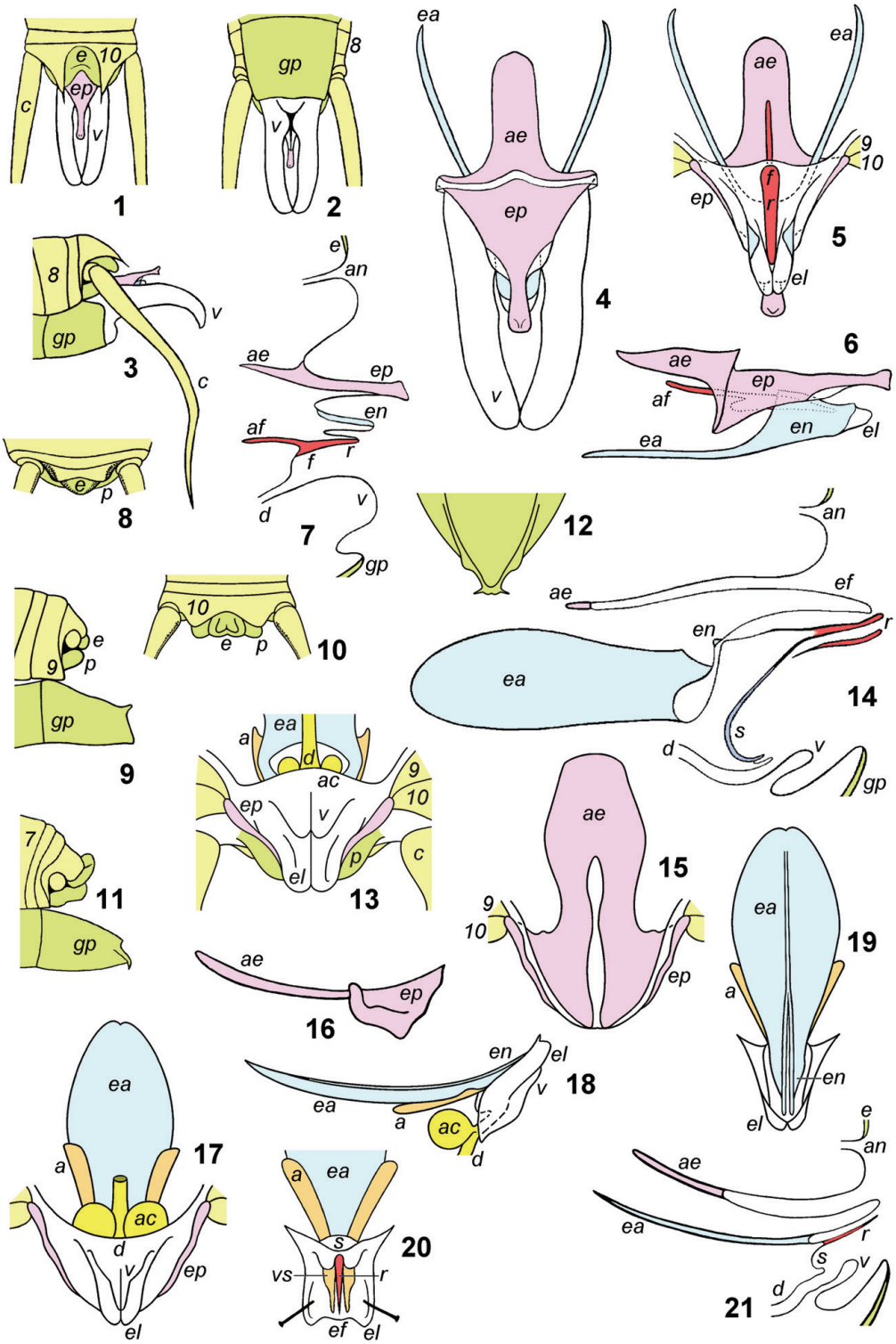
Holotype. Male, **Iran**, *Fars Prov*., Darab County, Chah Kondar Vill., Sahlak Canyon, 30°14′N, 52°05′E, Sahlak Cave, 4.XII.2016, M. Tahami (ZM-CBSU).

Paratypes. **Iran**: 15 males and 6 females (ZM-CBSU and ZIN), same data as for holotype; 9 males and 5 females, *Fars Prov*., Khafr County, Karaft Vill., 28°57′N, 52°49′E, Ab Kamouneh Cave, 8.I.2016, M. Tahami (ZM-CBSU and ZIN); 3 males and 1 female, *Fars Prov*., Maloujan Industrial Park, 29°51′N, 52°27′E, Maloujan Cave, 22.XII.2015, M. Tahami (ZM-CBSU); 2 females, 1 nymph of male and 18 nymphs of females, *Yazd Prov*., Herat County, Borueiyeh Wildlife Shelter, 30°07′N, 54°08′E, Khane Khoda Cave, 18.X.2014, M. Tahami (ZM-CBSU); 4 males, 11 nymphs of males and 14 nymphs of females, same locality but 30.IX.2015, M. Tahami (ZM-CBSU); 2 males, same locality but 12.IV.2016, M. Tahami (ZM-CBSU); 2 males and 1 female, *Kerman Prov*., Sirjan County, Gode Ghul No-hunting Area, 29°37′N, 55°7′E, Oota Cave, 4.I.2015, M. Tahami (ZM-CBSU).

Description. Male (holotype). Body typical of this genus in general shape but rather large. Colouration whitish with several distinct darker marks: eyes blackish with upper third light brown; epicranium with short and narrow longitudinal brownish grey stripe behind eye and with very small darkish marks between antennal cavities; pronotum with four brownish spots along anterior edge and four brownish spots along posterior edge, but each lateral spot near

posterior edge connected with nearest medial spot by short and narrow stripe (Fig. VI: 1); mesonotum with three brownish spots (lateral spots somewhat smaller) and a few darkish dots between them; metanotum and two anterior abdominal tergites with three very light brown spots fused with each other along posterior edge; third abdominal tergite with a pair of similar but shorter spots; fourth–ninth abdominal tergites with traces of latter spots in shape of transverse stripes along posterior edges; tenth abdominal tergite with a pair of distinct brown spots widely separated from each other; epiproct with light greyish brown dorsum having clearly lighter median part; paraprocts with light greyish brown outer area (Fig. VIII: 1); cerci with greyish stripe along inner surface; legs with a pair of brownish spots (outer and inner) on all femora near their apex, with additional barely lighter area on ventral half of middle part of hind femur, with almost brown small dorsal spot on all tibiae near their base, and with light greyish brown most part of dorsal half of all tibiae (but spines whitish) (Figs VI: 2, 3). Head with rostrum between antennal cavities approximately 1.6 times as wide as this cavity; eyes rather narrow, almost vertical, with clearly developed facets in lower two thirds and without them in upper third (Fig. VI: 1); maxillary palpi rather long and thin, with apical segment longer than each of other segments but slightly widened in apical part (Fig. VI: 1). Pronotum transverse, with convex anterior edge, almost straight posterior edge, and more or less truncate lateral lobes; pterothoracic tergites similar to abdominal tergites in dorsal view, but metanotum distinctly longer (wider) than mesonotum and each abdominal tergite. Legs slender; fore and middle tibiae with a pair of ventral apical spurs; hind femur moderately thickened; hind tibia with four outer and five inner rather long and articulated spines (one outer distal, one inner subdistal and one inner proximal spines shorter than other spines), with a pair of dorsal apical spurs distinctly longer than all these spines, with a pair of middle apical spurs almost equal to short spines in length, and with a pair of ventral apical spurs shortest; hind basitarsus with a pair of subapical spines (apical spurs?) almost equal to latter spurs in length (inner spine located in somewhat more distal position than outer one). Tenth abdominal tergite with slightly concave posterior edge separating this tergite from rather small and more or less triangular epiproct (Fig. VIII: 1); genital plate not large but distinctly longer than tenth abdominal tergite and epiproct together, almost triangular in ventral (or dorsal) view but with a pair of angular posterior projec-

Figs III (1–21). Male abdominal structures of Myrmecophilidae (membranous parts not painted). **1–7**, *Microbothriophylax mica* Gor.; **8, 9**, *Eremogryllodes major* Chop.; **10–12**, *E. monodi* Chop.; **13, 14**, *Bothriophylax vlasovi* (Mir.); **15–21**, *Myrmecophilus oculatus* Mir. Abdominal apex without genital plate from above (1, 8, 10), and with this plate but from below (2) and from side (3, 9, 11); genitalia from above (4), from below and with small parts of tergites articulated with epiphallus (5, without valves, accessory glands and ejaculatory duct; 13, with these structures but without most part of endoparameral apodeme; 17, with all these structures), from side (6, without membranous structures except for distal ones; 18, with most part of membranous structures), from above but without epiphallus (19), and from below but without epiphallus and some other structures (valves, accessory glands, ejaculatory duct and anterior half of endoparameral apodeme) (20); distal half of genital plate from above (12); scheme of sagittal section of genitalia with some nearest structures (7, 14, 21). [1–7, 13–21, after Gorochov (1980, 1993), modified]. *Abbreviations*: *8*, *9*, *10*, 8th–10th abdominal tergites; *a*, ectoparameral apodema; *ae*, apodema of epiphallus; *ac*, accessory gland; *af*, apodeme of formula; *an*, anus; *c*, cercus; *d*, ejaculatory duct; *e*, epiproct; *ea*, endoparameral apodeme; *en*, endoparamere (endoparameral sclerite); *ef*, endoparameral fold; *el*, ectoparameral lobe; *ep*, epiphallus; *f*, formula?; *gp*, genital plate; *p*, paraproct; *r*, rachis; *s*, sacculus; *v*, valve or common base of valves; *vs*, ventral sclerite of endoparameral fold (or of ectoparameral lobe).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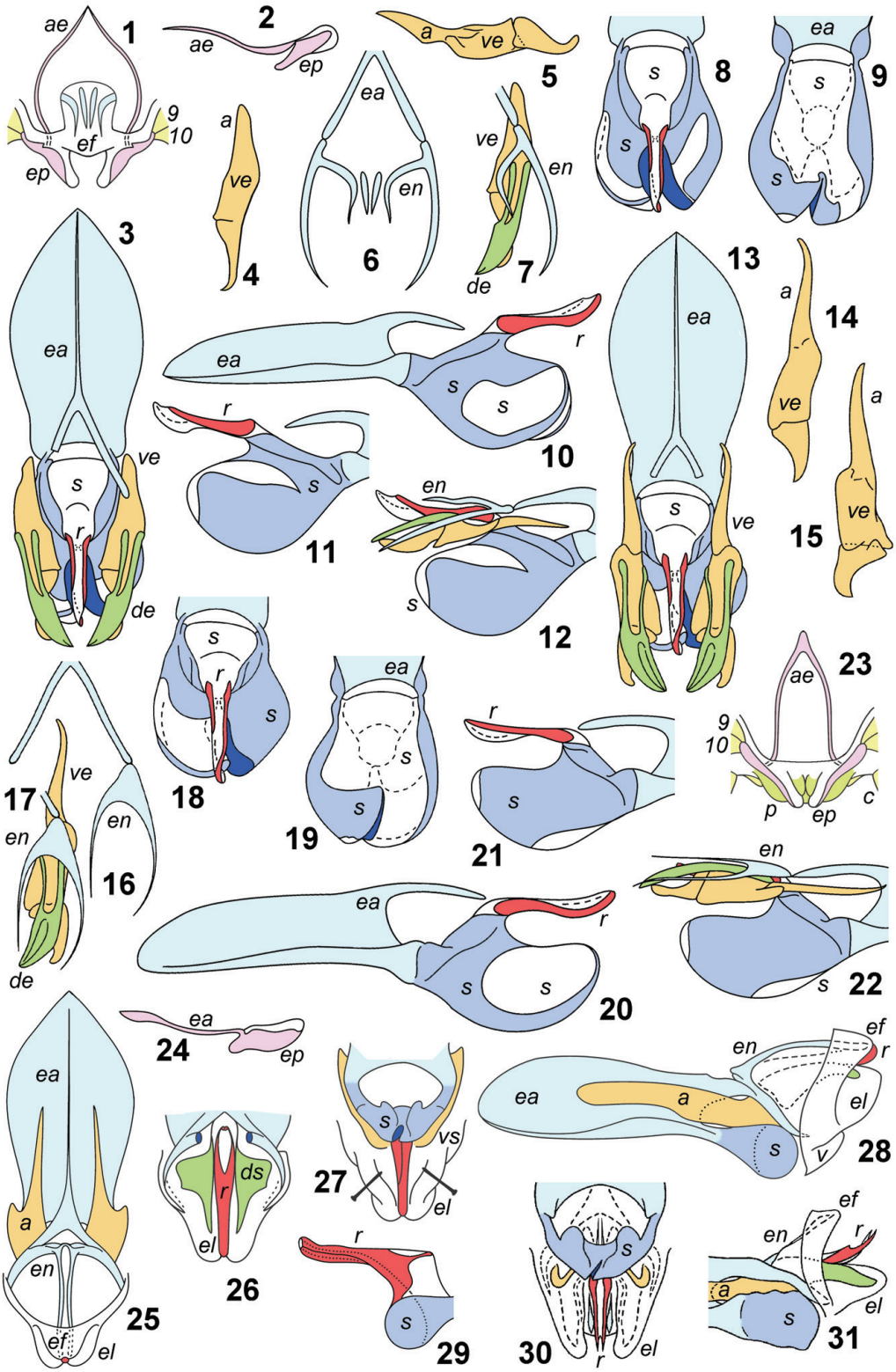
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tions and moderately deep and narrow posterior notch between them (this notch more or less rounded) (Figs VIII: 2, 3). Genitalia (Figs VII: 1, 2) most similar to those of *E. major* but with following characteristic features: epiphallus having lateral parts rather small (almost finger-like) and partly sclerotized; sclerotized structures of these parts widely separated from each other, narrow (slightly wider than sclerotized ribbon between them), and with almost hook-like apical tubercle; Figs VII: 11, 12); a pair of V-shaped endoparameral sclerites (articulated with dorsal arms of endoparameral apodeme) having distinctly more transverse basal part (for comparison see Figs IV: 16; VIII: 5); dorsal ectoparameres clearly longer and narrower (see Figs IV: 13; VIII: 7); ventral ectoparameres with posterolateral sclerite distinctly longer and having narrower (lower) anterior part in profile, and with proximal sclerite higher in posterior part as well as having much shorter anterior apodeme and rather long posteromedial hook directed backwards-upwards (this sclerite in left ectoparamere with very small medial tubercle before this hook) (Figs VIII: 8, 11); rachis distinctly longer (almost reaching apices of dorsal ectoparameres), with distal part moderately curved upwards and having a pair of rather small but elongate and slightly asymmetrical apical lobules (right lobule almost completely desclerotized and with very small but distinct hook at apex; Figs VIII: 12, 13); sacculus with left half having smaller (narrower) membranous area (almost as in *E. monodi*; see Figs IV: 8, 10), and with right half almost indistinguishable from that of *E. major* (see Figs IV: 21, 22) but having somewhat larger membranous apical part (almost as in Figs IV: 11, 12).

Variations. Males from different caves with slight differences in colouration and copulatory structures: epicranium sometimes without darkenings on anterior part; darkened spots on tergites often slightly larger or smaller than in holotype; epiproct, paraprocts and/or cerci sometimes almost completely light (Fig. VI: 4); some males with posterior part of genital plate more obliquely truncated at profile (Fig. VIII: 4) and/or with endoparameral sclerites somewhat varied in shape (Figs VIII: 5, 6); some males from Sahlak Cave as well as males from Khane Khoda Cave with right ventral ectoparamere having small medial tubercle on basal part of its posteromedial hook (Fig. VIII: 9), males from Malousjan Cave with such tubercle somewhat larger (Fig. VIII: 10), and males from Ab Kamouneh and Oota Caves with all medial tubercles of ectoparameres indistinct.

Female. General appearance as in males, but body slightly smaller; genital plate very short and with almost truncated or widely

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Figs IV (1–31). Male genitalia of Bothriophylacinae without accessory glands and ejaculatory duct (membranous parts not painted). **1–12**, *Eremogryllodes monodi* Chop.; **13–22**, *E. major* Chop.; 23–29, *Bothriophylax vlasovi* (Mir.); **30, 31**, *B. arab* Gor. Epiphallus with small parts of tergites articulated with it from below (1, with median part of endoparameral fold and its sclerites; 23, without this fold but with paraprocts), and from side but without tergites (2, 24); genitalia without epiphallus from above (3, 13, without endoparameral fold and membranous parts of ectoparameral lobes; 25, with these fold and parts), and from side (10, 20, without valves, endoparameral fold, ectoparameral lobes and their sclerites; 28, with these structures); ventral ectoparamere from above (4, 14) and from side (5, 15); endoparamere from above (6, left and right; 16, only right); endoparamere with dorsal and ventral ectoparameres from above (7, 17); sacculus with rachis from above (8, 18), from side (11, 21), from below but without rachis (9, 19), and from side but with rachis as well as endoparamere and ectoparameres (12, 22); distal half of genitalia without epiphallus and most part of endoparameral fold from above (26), from below but besides without valves (27, 30), and from side but also without valves and additionally with endoparameral fold (31). [23–31, after Gorochov (1980, 2017), modified]. *Abbreviations*: *de*, dorsal ectoparamere; *ds*, dorsal sclerite of ectoparameral lobe; *ve*, ventral ectoparamere; others, as in Figs III (1–21).

and shallowly notched posterior part (Figs V: 1, 2); ovipositor distinctly shorter than hind femur and with short barely denticulate part of dorsolateral edge in each dorsal valve very near its apex (Fig. V: 1).

Length in mm. Body: male 7.7–9.6, female 5.6–7.3; pronotum: male 1.7–2.1, female 1.4–1.9; fore femur: male 3–3.9, female 2.5–3.2; fore tibia: male 2.9–3.7, female 2.5–3.3; middle femur: male 3.2–4.2, female 2.5–3.3; middle tibia: male 3–3.9, female 2.5–3.2; hind femur: male 5.5–6.9, female 4.8–6.1; hind tibia: male 5.6–7.4, female 5–6.5; hind basitarsus: male 1.9–2.6, female 1.5–2; ovipositor 2.9–3.3.

Comparison. The new species is most similar to *E. major* but distinguished from it by the absence of darkenings on head under eyes, clearly larger anteromedial darkened spots on the pronotal disc, the male genital plate with its posterolateral lobules more or less widely angular (not almost spine-like) and with its posteromedian part not projected behind these lobules (for comparison see Figs III: 9; VIII: 2–4; XII: 16), and the characters of male genitalia named above (in the description of *E. iranicus* **sp. nov.**). From *E. monodi*, the new species differs in the lighter body colouration, narrower sclerite of epiphallic lateral part having an almost hook-like apical tubercle (see Figs IV: 1, 2; VII: 11, 12), longer medial branches (ribbons) of endoparameral sclerites in the male genitalia, different shape of basal parts of these sclerites (Figs IV: 6; VIII: 5, 6), absence of additional short sclerotized stripes between these sclerites, narrower dorsal ectoparameres (Figs IV: 3; VIII: 7), proximal sclerite of ventral ectoparameres with the higher posterior half and long posteromedial hook (Figs IV: 4, 5; VIII: 8–11), longer rachis having the apical part more distinctly curved upwards (Figs IV: 3, 10, 11; VII: 1–4; VIII: 13), and absence of distinct membranous area on the dorsal part of right half of sacculus. From all the other species having less clear generic belonging but included in *Eremogryllodes* by the previous authors, it differs in more numerous spines of the hind tibiae: the new species has four outer and five inner spines, but the above-mentioned representatives have three outer and two inner spines (*E.? pallidus* and *E.? fiorii*), three pairs of spines (*B.? uvarovi*, *M.? seurati* and *M.? fitzgeraldi*) or three outer and four inner spines (*B.? richteri*)].

Etymology. The new species is named after the Iran Country where it is rather widely distributed.

Remark. This species has clearly spotted colouration and probably is a facultative inhabitant of caves with rather wide distribution (in three provinces of Iran). Possibly it has two apomorphic characters at least: the proximal sclerite of ventral ectoparamere has a long posteromedial hook; right apical lobule of rachis is desclerotized (the latter character is probably a unique autapomorphy of this species). In different localities, *E. iranicus* **sp. nov.** has insignificant or very small differences in the body colouration and structure of the male genitalia; possibly it consists of a few subspecies, but this question requests an additional study.

Eremogryllodes persicus Tahami et Gorochov, **sp. nov.**
(Figs V: 3; VI: 5; VII: 5, 6; VIII: 14–26)

Holotype. Male, **Iran**, *Fars Prov.*, Khafr County, Tadovan Vill., 28°50′N, 53°19′E, Tadovan Cave, 16.XI.2015, M. Tahami (ZM-CBSU).

Paratypes. **Iran**: 4 males, 1 female, 1 nymph of male (ZM-CBSU and ZIN), same data as for holotype; 3 males and 1 female, same cave but 25.II.2016, M. Tahami (ZM-CBSU); 2 males and 4 females, *Kerman Prov.*, Jiroft County, Rood Fargh Vill., 28°31′N, 58°10′E, Rood Fargh Cave, 7.I.2015, M. Tahami (ZM-CBSU and ZIN).

Description. Male (holotype). Colouration and external structure of body similar to those of holotype of *E. iranicus* **sp. nov.** but with following differences: anterior part of head completely light; darkened spots and areas on tergites and legs slightly smaller and somewhat lighter (medial spots on pronotum distinctly smaller, mesonotum without lateral spots, and median spots on metanotum and abdominal tergites absent;

Fig. VI: 5); hind tibiae with four outer and 4–5 inner spines (proximal inner spine of right hind tibia absent); genital plate with angular dorsoapical lobules slightly more projected backwards (Fig. VIII: 15, 16). Genitalia also very similar to those of *E. iranicus* **sp. nov.**, but each V-shaped endoparameral sclerite with anteromedial projection (lobe) more elongated and slightly curved medially (Fig. VIII: 18), ventral ectoparameres without distinct tubercles on medial surface (including medial part of their medial hook) and with slightly shorter posteromedial hook of left ventral ectoparamere (Figs VIII: 20, 22), and rachis with right apical lobule not desclerotized (i. e. more or less similar to left apical lobule) but having less distinct hook at apex (Figs VIII: 23, 24).

Variations. Spots on tergites and legs sometimes slightly darker or lighter; all ectoparameres insignificantly varied in shape (Figs VIII: 19, 21); in one male from Tadovan Cave, hind tibia with six inner spines, but additional spine clearly shorter than other spines of this tibia and located behind two proximal spines; in males from Rood Fargh Cave, last abdominal tergite with larger darkenings dorsally (Fig. VIII: 14), and right apical lobule of rachis with more distinct hook at apex (Figs VIII: 25, 26).

Female. General appearance as in males, but structure of abdominal apex indistinguishable from that of female of *E. iranicus* **sp. nov.** with truncated genital plate.

Length in mm. Body: male 7.8–9.1, female 5.9–7; pronotum: male 1.7–2, female 1.6–1.9; fore femur: male 3–4, female 2.4–3; fore tibia: male 3.1–3.9, female 2.2–3; middle femur: male 3.1–4, female 2.4–3.2; middle tibia: male 3.3–4.1, female 2.4–3; hind femur: male 5.5–6.8, female 4.5–5.7; hind tibia: male 5.7–7.1, female 4.7–5.6; hind basitarsus: male 2–2.6, female 1.7–2; ovipositor 2.6–3.2.

Comparison. The new species is most similar and related to *E. iranicus* **sp. nov.**, but it differs from the latter species in the less spotted abdomen (lacking median darkened spots) and in the right apical lobule of rachis not desclerotized. From all the other true and possible congeners, the new species is distinguished by the same features as *E. iranicus* **sp. nov**.

Etymology. The new species is named after the name of ancient Iran originated from its historical region Parsi (Persis in Latin).

Remark. This species has barely lighter colouration than in *E. iranicus* **sp. nov.**; probably it is also a facultative inhabitant of caves but slightly more connected with life in caves and distributed in two provinces of Iran. The species is synapomorphic with *E. iranicus* **sp. nov.** because the both congeners have long posteromedial hooks on the proximal sclerites of ventral ectoparameres, but the structure of its rachis is more plesiomorphic than in *E. iranicus* **sp. nov.** (the right apical lobule of rachis is not desclerotized). Besides we cannot exclude that the above-listed specimens of *E. persicus* **sp. nov.**, originated from different caves and having insignificant differences, belong to two very similar subspecies; this question also requests an additional study.

Eremogryllodes persicus torangae
Tahami et Gorochov, **subsp. nov.**
(Figs VI: 6; VII: 7, 8; VIII: 27–32)

Holotype. Male, **Iran**, *Kerman Prov.*, Baft County, Torang Vill., 28˚45´N, E 56˚49´E, Torang Cave, 5.I.2015, M. Tahami (ZM-CBSU)

Paratypes: 1 male and 2 females, same data as for holotype (ZM-CBSU and ZIN); 1 male, same locality but 11.X.2016, Y. Bakhshi, M.J. Malek Hosseini (ZM-CBSU).

Description. Male (holotype). General appearance very similar to that of holotype of nominotypical subspecies; however, body colouration slightly lighter (medial darkened spots on anterior part of pronotum absent, all lateral darkened spots smaller, and mesonotum completely light; Fig. VI: 6) but with completely darkened border along posterior edge of 3rd–9th abdominal tergites and with darkened spots on last tergite intermediate between those of *E. p. persicus* **subsp. nov.** from Rood Fargh Cave and

holotype of this subspecies (Fig. VIII: 27), hind tibia with six inner dorsal spines (as in male paratype from Tadovan Cave), and genital plate with distal part intermediate between such parts pictured in Figs VIII: 16 and 17 (but posterolateral lobules of this plate slightly less acute-angled). Genitalia also very similar to those of *E. p. persicus* **subsp. nov.**, but left ventral ectoparamere with distinct medial spinule at base of its posteromedial hook (Fig. VIII: 28), right one without such spinule (Fig. VIII: 29), and rachis with thinner and desclerotized apex of right apical lobule lacking any distinct hook (Figs VIII: 31, 32).

Variations. Sometimes darkened spots on abdomen lighter (poorly distinct), and darkened borders along posterior edges of abdominal tergites with light median part.

Female. Colouration and structure of body as in males, but hind tibia with five inner dorsal spines, and structure of abdominal apex as in *E. p. persicus* **supsp. nov.**.

Length in mm. Body: male 8.4–9.2, female 6.4; pronotum: male 1.7–2.2, female 1.8; fore femora: male 3.3–3.6, female 3; fore tibiae: male 3.5, female 3; middle femora: male 3.7–3.8, female 3; middle tibiae: male 3.6–3.7, female 2.9; hind femora: male 6.5, female 5.5; hind tibiae: male 6.5, female 5.6; hind basitarsus: male 2.4, female 1.9; ovipositor 3.1.

Comparison. The new subspecies differs from *E. p. persicus* **subsp. nov.** in the somewhat lighter body colouration, presence of a medial spinule at the base of posteromedial hook of left ventral ectoparamere, and right apical lobule of rachis with the thinner and desclerotized apex lacking any hook. From the other true and possible congeners, the new subspecies is distinguished by the same characters as *E. p. persicus* **subsp. nov.**.

Etymology. This subspecies is named after the Torang Cave where it was collected (Torang is the name of feminine gender).

Remark. This subspecies is somewhat lighter than the both congeners previously described here and is possibly a semiobligatory inhabitant of caves known from only a single cave. We cannot exclude that it is a separate species more specialized to life in caves than the above-mentioned congeners.

Eremogryllodes persicus lari
Tahami et Gorochov, **subsp. nov.**
(Figs VI: 7; VII: 9, 10; VIII: 33–36)

Holotype. Male, **Iran**, *Fars Prov.*, Larestan County, 5 km before Khonj, 27°44´N, 53°20´E, Khan Cave, 27.IV.2016, M. Tahami (ZM-CBSU).

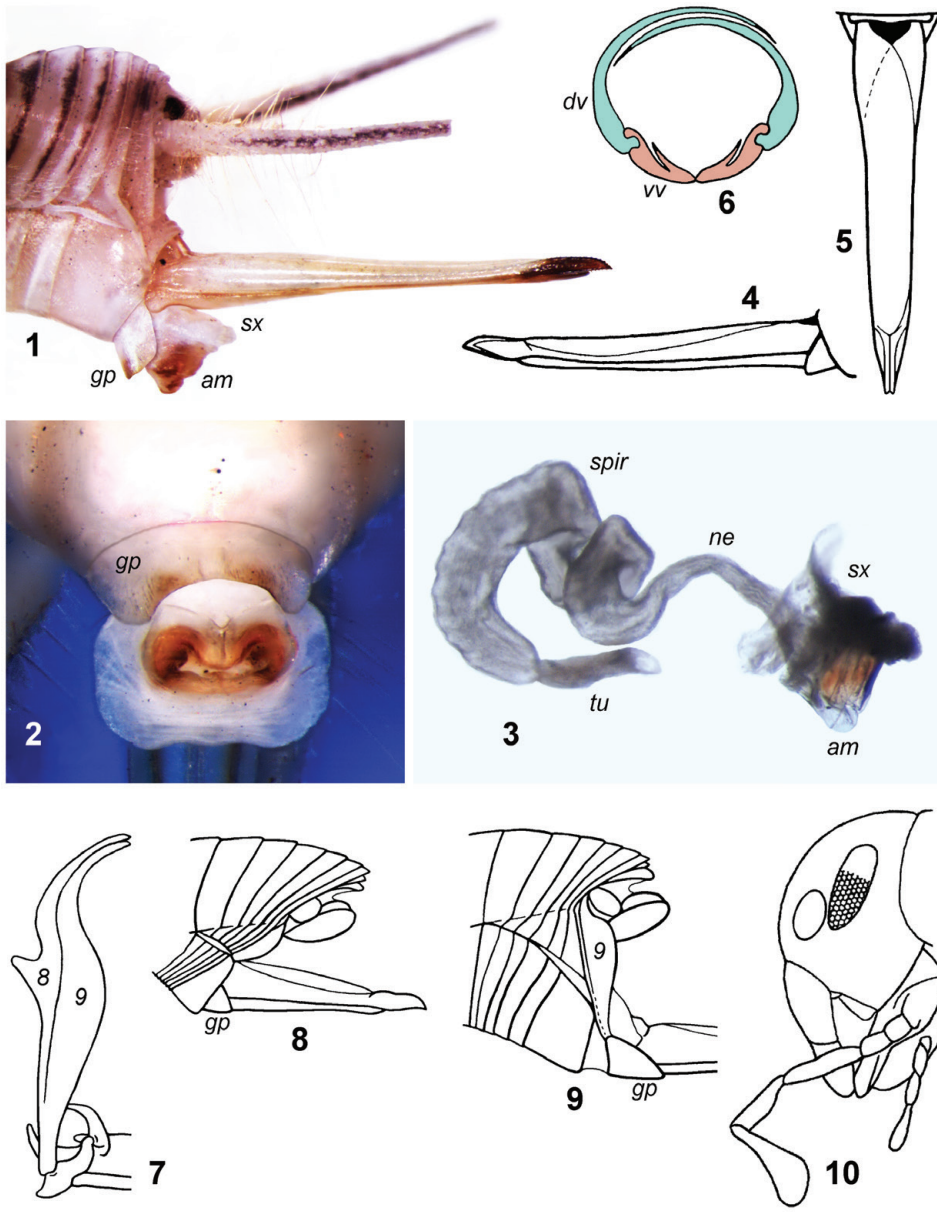
Paratypes: 1 nymph of male, same data as for holotype (ZM-CBSU); 6 nymphs of males, same locality but 10.XI.2015, M. Tahami (ZM-CBSU); 1 nymph of male, same locality but 9.XI.2016, M. Tahami (ZM-CBSU).

Description. Male (holotype). General appearance most similar to that of lightest males of *E. p. torangae* **subsp. nov.** but without darkened marks on epicranium above eyes and on epiproct and paraprocts (however, a pair of small darkened spots on last tergite developed and similar to that pictured in Fig. VIII: 1), with five inner dorsal spines on hind tibia, and with genital plate having distal part approximately as in Figs VIII: 4, 15, 16. Genitalia very similar to those of *E. p. persicus* **subsp. nov.** and *E. p. torangae* **subsp. nov.** but distinguished from them by presence of distinct medial spinule at base of posteromedial hook of right ventral ectoparamere (Fig. VIII: 34), and from only *E. p. torangae* **subsp. nov.** by absence of such spinule on left ventral ectoparamere (Fig. VIII: 33) as well as by rachis with wider and slightly hooked (almost as in holotype of *E. p. persicus* **subsp. nov.**) right apical lobule (both rachial lobules of male studied significantly desclerotized possibly as result of insufficient development of genitalia in very young imago; Figs VIII: 35, 36).

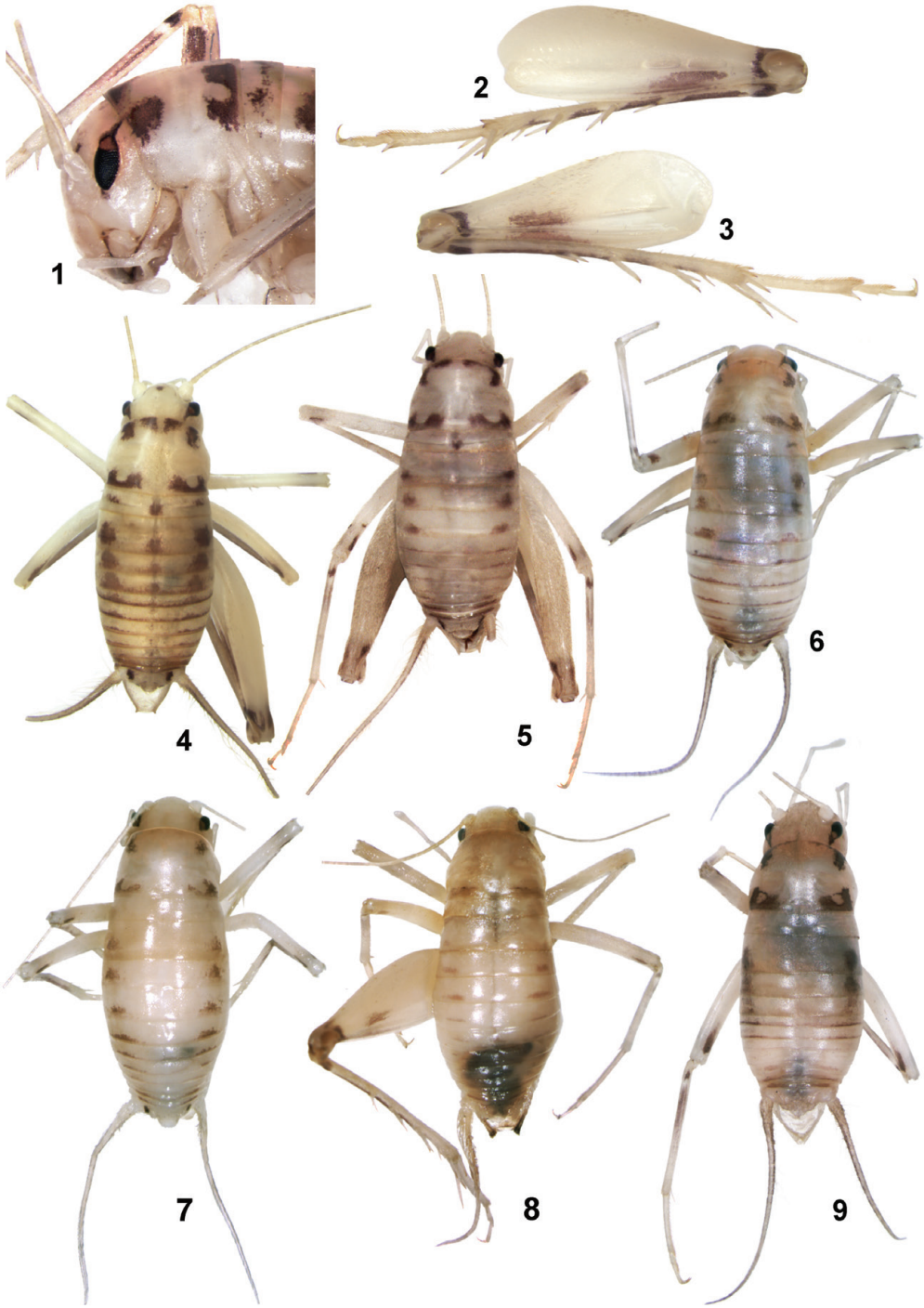
Female unknown.

Length in mm (adult male). Body 8.8; pronotum 1.8; fore femora 3.6; fore tibiae 3.3; middle femora 3.5; middle tibiae 3.1; hind femora 6; hind tibiae 6.2; hind basitarsus 2.2.

Comparison. The new subspecies is most similar to *E. p. torangae* **subsp. nov.** in the



Figs V (1–10). Female genitalia and spermatophore of Myrmecophilidae. **1, 2**, *Eremogryllodes iranicus* **sp. nov.** from Khane Khoda Cave; **3**, *E. persicus* **sp. nov.** from Rood Fargh Cave; **4, 5**, *Bothriophylax vlasovi* (Mir.); **6–9**, *Myrmecophilus oculatus* Mir.; **10**, *E.? fiorii* La Greca. Female abdominal apex with attached spermatophore from side (1); region of ovipositor base with attached spermatophore from below (2); spermatophore from side (3); ovipositor from side (4) and from above (5), as well as scheme of its transverse section (6); sclerites of ovipositor base articulated with fused parts of eighth and ninth tergites (7); abdominal apex with ovipositor drawn under abdomen (8) and with ovipositor base in work position (9); head without antennae from side (10). [4–10, after La Greca (1969) and Gorochov (1980), modified]. *Abbreviations*: *8*, *9*, 8th and 9th abdominal tergites; *am*, ampulla of spermatophore; *dv*, dorsal valve of ovipositor; *gp*, female genital plate; *ne*, neck (= collum) of spermatophore; *spir*, spiral part (= ancora or attachment plate ?) of spermatophore; *sx*, spermatophylax?; *tu*, tube of spermatophore; *vv*, ventral valve of ovipositor.



Figs VI (1–9). *Eremogryllodes*, male. **1–4**, *E. iranicus* **sp. nov.** (1–3, holotype; 4, Ab Kamouneh Cave); **5**, *E. persicus* **sp. nov.** (holotype); **6**, *E. p. torangae* **subsp. nov.** (holotype); **7**, *E. p. lari* **subsp. nov.** (holotype); **8**, *E. dilutus* **sp. nov.** (Balezar Cave); **9**, *E. d. bakhtiyari* **subsp. nov.** (holotype). Head with pronotum from side (1); hind leg, outer (2) and inner (3) views; body from above (4–9) with all (or almost all) legs (4, 5, 8) and without hind legs (6, 7, 9).

body colouration and structure of its ventral ectoparameres, but these ectoparameres are mirror symmetrical (*E. p. torangae* **subsp. nov.** has a spinule on the left ectoparamere only, but *E. p. lari* **subsp. nov.** is with a spinule on the right ectoparamere only), and rachis in the both subspecies is with similarly but not identically asymmetrical lobules (right lobule in *E. p. lari* **subsp. nov.** is clearly wider than in *E. p. torangae* **subsp. nov.**, and with the more hooked apex; however, their left lobules are more or less similar to each other and clearly different from right ones). From all the other true and possible congeners, the new subspecies differs in the same characters as *E. p. torangae* **subsp. nov**.

Etymology. The subspecies is named after the Lari people, who are an Iranian ethnic group that lives mainly in the Larestan County where this subspecies was collected.

Remark. This subspecies has the body colouration very similar to that of *E. p. torangae* **subsp. nov.** and is a possible semiobligatory inhabitant of caves known from only a single cave. We also cannot exclude that it is a separate species similar to *E. p. torangae* **subsp. nov.** in its cave habits.

Eremogryllodes dilutus
Tahami et Gorochov, **sp. nov.**
(Figs VI: 8; IX: 1, 2; X: 1–22)

Holotype. Male, **Iran**, *Fars Prov*., Marvdasht County, Miyan Ghale Vill., 30˚3′N, 52˚44′E, Palangan Cave, 18.XII.2014, M. Tahami (ZM-CBSU).

Paratypes. **Iran**: 1 male and 1 female, same data as for holotype (ZM-CBSU and ZIN); 3 males, 2 females, 3 nymphs of males and 9 nymphs of females, *Fars Prov*., 5 km before Marvdasht County, 30˚01′N, 52˚54′E, Momtaz Cave, 16.X.2015, M. Tahami (ZM-CBSU and ZIN); 1 female and 1 nymph of male, same locality but 11.XI.2016, M. Tahami (ZM-CBSU); 2 males, *Fars Prov*., Haft Barm, Balezar Vill., 29˚51′N, 52˚01′E, Balezar Cave, 11.IX.2015, M. Tahami (ZM-CBSU); 7 males, 3 females and 3 nymphs of females, *Khuzestan Prov*., Behbahan County, Khaeiz Protected Area, Khaeiz Vill., 30˚38′N, 50˚25′E, Ab Konardoun Cave, 8.XII.2015, M. Tahami (ZM-CBSU and ZIN); 1 male, same locality but 27.XI.2016, M. Tahami (ZM-CBSU); 6 males and 3 females, *Khuzestan Prov*., Lali County, Ar Panah Vill., 32˚26′N, 49˚13′E, Pebdeh Cave, 17.II.2016, M. Tahami (ZM-CBSU and ZIN); 2 males and 1 nymph of male, same locality but 30.XI.2016, M. Tahami (ZM-CBSU), 2 males and 2 females, *Ilam Prov*., 33˚16′N, 47˚13′E, Sarab Cave, 12.VII.2014, H. Darvishniya (ZM-CBSU); 3 males, 1 female and 1 nymph of female, same locality but 26.VI.2015, H. Darvishniya (ZM-CBSU); 12 males and 1 female, *Khuzestan Prov*., Mal Agha County, Mal Agha Canyon, 31˚36′N, 50˚02′E, Ker Palang Cave, 16.II.2016, M. Tahami (ZM-CBSU); 7 males and 6 females, *Khuzestan Prov*., Mal Agha County, Mal Agha Canyon, 31˚36′N, 50˚02′E, Shekam Kooseh Cave, 16.II.2016, M. Tahami (ZM-CBSU); 1 male, same locality but 29.XI.2016, M. Tahami (ZM-CBSU); 10 males and 2 females, *Kohgiluyeh and Boyer Ahmad Prov*., Pataveh County, Deh Sheykh Vill., 30˚57′N, 51˚14′E, Deh Sheykh Cave, 11.X.2015, M. Tahami (ZM-CBSU and ZIN); 2 males and 1 female, same locality but 8.X.2016, M. Tahami (ZM-CBSU); 1 male, *Kohgiluyeh and Boyer Ahmad Prov*., Dehdasht County, Nur Mountain, 30˚47′N, 50˚56′E, Nezel Cave, 26.VIII.2016, E. Shaniti (ZM-CBSU).

Description. Male (holotype). Size and external structure of body similar to those of both previous species of *Eremogryllodes* from Iran, but colouration more uniformly light: head with dark brown eyes having dorsal quarter light brown and with very small brownish marks above eyes; pronotum with four short brownish stripes along anterior and posterior edges; other tergites with only poorly distinct light brown lines along posterior edges (these lines with light median part, and mesonotum and last abdominal tergite completely light); legs with small greyish brown marks on femora near their apex and on fore and middle tibiae near their base as well as along dorsal surface of hind tibia and on middle part of inner and outer surfaces of hind femur near its ventral edge; epiproct, paraprocts and genital plate uniformly light, but cerci with barely darkened stripes along inner and outer surfaces. Hind tibia with six inner dorsal spines, but subproximal and subdistal ones shorter than other inner dorsal

spines of this tibia; genital plate with a pair of elongate and angular dorsoapical lobules similar to those of some males of *E. iranicus* **sp. nov.** and *E. persicus* **sp. nov.** (Fig. X: 4). Genitalia also similar to those of these species, but V-shaped endoparameral sclerites approximately as in *E. persicus* **sp. nov.** in shape (Fig. X: 8), ventral ectoparameres with distinctly shorter posteromedial hook of proximal sclerite (this hook invisible behind base of distal sclerite of this ectoparamere; Figs X: 11, 12), and rachis with apical lobules asymmetrical almost as in these species but with following characteristic features: both lobules rather long; left lobule with narrow sclerotized ribbon; right lobule shorter than left one, narrow in profile, not desclerotized, and with very slight hook at apex (Figs X: 17, 18).

Variations. Males from different caves with some differences in body colouration, armament of legs and structure of distal part of rachis: their head and tergites varied from almost uniformly light (Fig. VI: 8) to slightly spotted (with rather small and slight spots similar to those of *E. p. torangae* **subsp. nov.** and *E. p. lari* **subsp. nov.**; Figs VI: 6, 7); fore and middle tibiae mainly light or slightly and partly darkened; epiproct, paraprocts, cerci and genital plate almost uniformly light or with somewhat darkened marks (Fig. X: 1); hind tibiae with inner dorsal spines varied in number (5–6); male genitalia with endoparameral sclerites and ectoparameres slightly varied (Figs X: 7–14), and with rachis having apical lobules somewhat varied in length as well as in width of their sclerotized parts and in shape of apices of these parts (Figs X: 15–22).

Female. General appearance as in males, but body smaller, hind tibia with 5 inner dorsal spines, and structure of abdominal apex as in female of *E. persicus* **sp. nov**.

Length in mm. Body: male 9–11, female 6.8–8; pronotum: male 1.7–2.4, female 1.6–1.8; fore femur: male 3.3–4.7, female 3.2–3.7; fore tibia: male 3.3–4.6, female 3–3.6; middle femur: male 3.3–4.6, female 3.1–3.6; middle tibia: male 3.4–5, female 3.2–3.7; hind femur: male 6–7.6, female 5.8–6.4; hind tibia: male 6.2–8.6, female 6–6.6; hind basitarsus: male 2.1–2.7, female 1.9–2.2; ovipositor 2.9–3.2.

Comparison. The new species differs from *E.iranicus* **sp. nov.** and *E. persicus* **sp. nov.** in the less spotted body and distinctly shorter posteromedial hook of proximal sclerite of ventral ectoparamere, and additionally from *E. iranicus* **sp. nov.**, in the not desclerotized right apical lobule of rachis. From *E. major* and *E. monodi*, it is distinguished by the different shape of V-shaped endoparameral sclerites as well as presence of the above-mentioned posteromedial hook of ventral ectoparameres, and from all the other true and possible congeners, by the same characters as *E. iranicus* **sp. nov.** and *E. persicus* **sp. nov**.

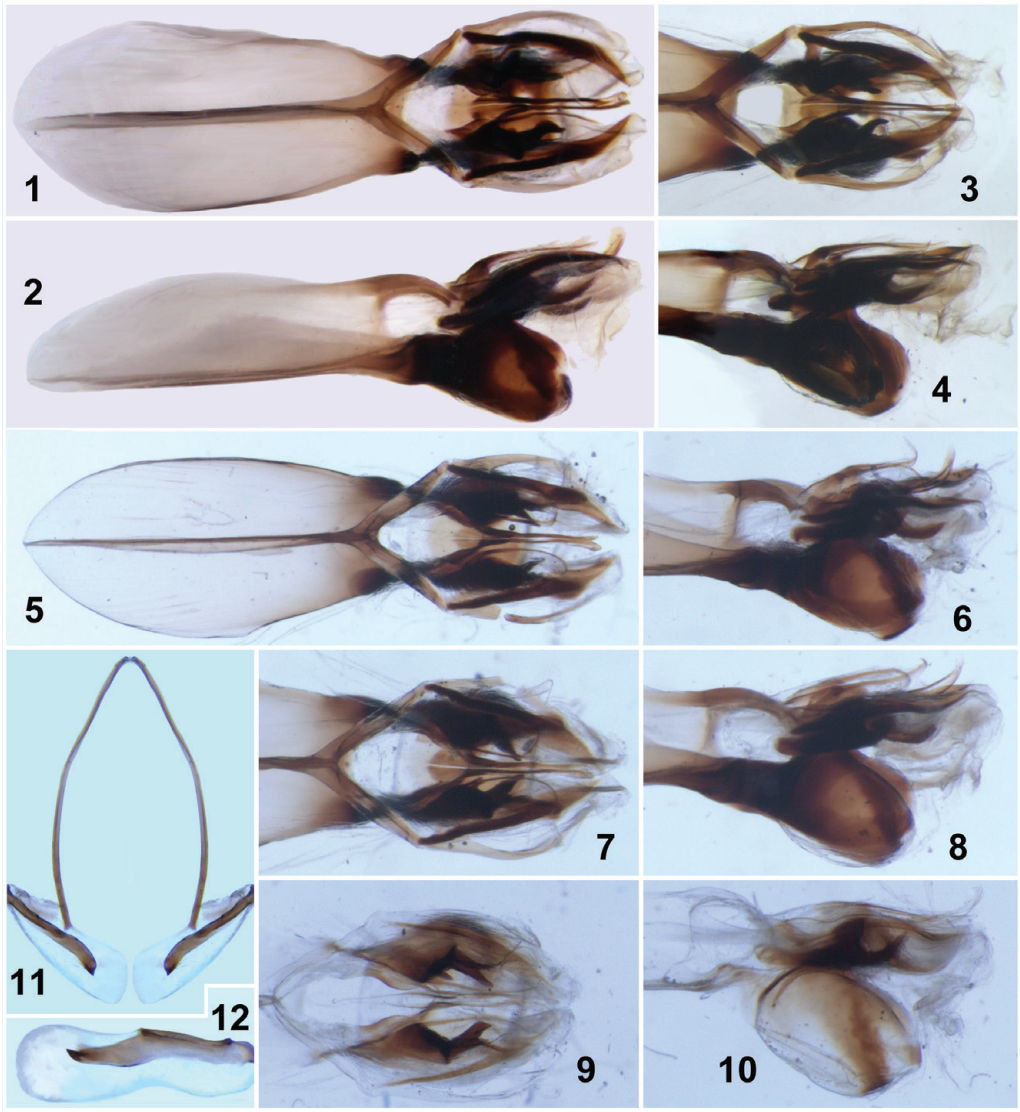
Etymology. Name of this new species is the Latin word "dilutus" (light, pale) due to its body colouration.

Remark. More or less uniformly light coloration of this species may indicate that its representatives are semiobligatory or almost obligatory inhabitants of caves. It is very probably that this species are divided into several subspecies with much more narrow areas; however, such division is in need of an additional study. This species stands out among the other Iranian congeners probably by the plesiomorphic characters (from *E. iranicus* **sp. nov.**, by the right apical lobule of rachis not desclerotized, and from it and *E. persicus* **sp. nov.**, by the posteromedial hook of ventral ectoparameres shorter), but *E. dilutus* **sp. nov.** as a whole is probably somewhat more specialized to life in caves than these species.

Eremogryllodes dilutus bakhtiyari
Tahami et Gorochov, **sp. nov.**
(Figs VI: 9; IX: 3, 4; X: 23–28)

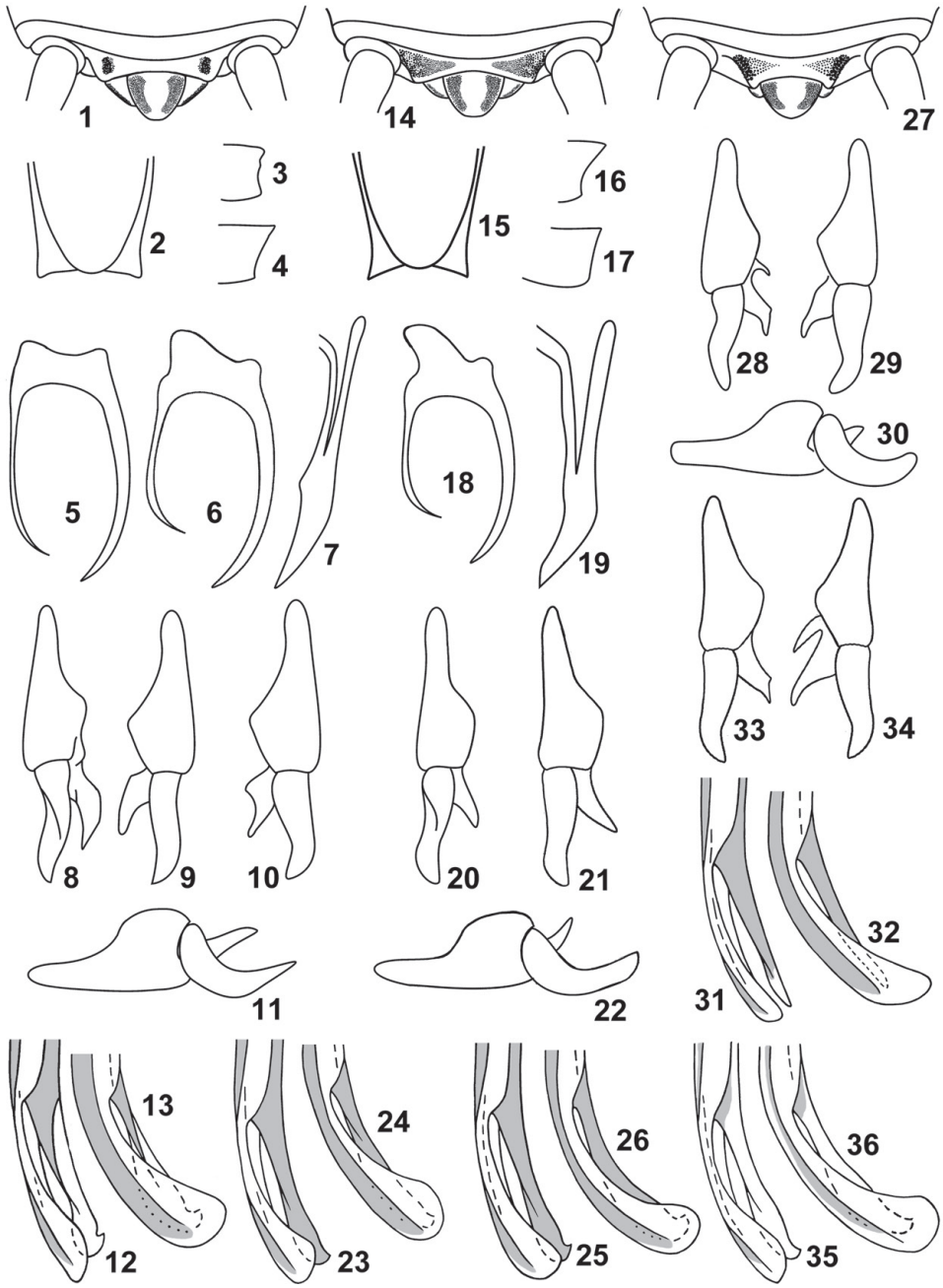
Holotype. Male, **Iran**, *Khuzestan Prov*., Meydavood County, Dasht-e Shir Region, 31˚27´N, 49˚45´E, Dasht-e Shir Cave, 15.II.2016, M. Tahami (ZM-CBSU).

Paratypes. 4 males and 5 females, same data as for holotype (ZM-CBSU and ZIN).



Figs VII (1–12). *Eremogryllodes*, male. **1–4**, *E. iranicus* **sp. nov.** (1, 2, holotype; 3, 4, Ab Kamouneh Cave); **5, 6**, *E. persicus* **sp. nov.** (paratype, Tadovan Cave); **7, 8**, *E. p. torangae* **subsp. nov.** (holotype); **9, 10**, *E. p. lari* **subsp. nov.** (holotype); **11, 12**, *E. iranicus* **sp. nov.** (holotype). Genitalia without epiphallus (1, 2, 5) as well as without both epiphallus and most part of endoparameral apodeme (3, 4, 6–10) from above (1, 3, 5, 7, 9) and from side (2, 4, 6, 8, 10); epiphallus from above (11, reconstructed view) and from side but without median ribbon (12).

Description. Male (holotype). General appearance very similar to that of nominotypical subspecies but with following characteristic features: head with colouration of eyes as in *E. d. dilutus* **subsp. nov.** and with distinct but small brown triangular spot above each eye; pronotum with more distinct (darker and larger) brown spots on pronotum; metanotum and two anterior abdominal tergites with light brown lateral spots; third, fourth, eighth and ninh abdominal tergites with brownish lines along



Figs VIII (1–36). *Eremogryllodes*, male. **1–13**, *E. iranicus* **sp. nov.** (1–3, 5, 7, 8, 11–13, holotype; 4, Ab Kamouneh Cave; 6, 9, Khane Khoda Cave; 10, Malousjan Cave); **14–26**, *E. persicus* **sp. nov.** (14–16, 18, 20, 22–24, holotype; 17, 19, 21, 25, 26, Rood Fargh Cave); **27–32**, *E. p. torangae* **subsp. nov.** (holotype); **33–36**, *E. p. lari* **subsp. nov.** (holotype). Abdominal apex from above (1, 14, 27); distal part of genital plate from above (2, 15) and from side (3, 4, 16, 17); right V-shaped endoparameral sclerite from above (5, 6, 18); right dorsal ectoparamere from above (7, 19); left (8, 11, 20–22, 28, 30, 33) and right (9, 10, 29, 34) ventral ectoparameres from above (8–10, 20, 21, 28, 29, 33, 34) and from side (11, 22, 30); distal part of rachis from more or less above (12, 23, 25, 31, 35) and from side (13, 24, 26, 32, 36), non-membranous parts painted in grey.

posterior edges (two posterior lines barely distinct); cerci with distinct inner and outer darkish longitudinal stripes; legs similar to those of *E. d. dilutus* **subsp. nov.** but fore and middle tibiae as in some specimens of this subspecies (i.e. with slightly darkened areas on their dorsoproximal halves); rest of body completely light (including last abdominal tergite, epiproct, paraprocts and genital plate; Fig. VI: 9); hind tibia with three outer and five inner dorsal spines; genital plate with apex approximately as in Fig. X: 4. Genitalia also similar to those of this subspecies, but V-shaped endoparameral sclerites with moderately short and almost straight (not arcuate) anterior projection (Fig. X: 24), each ventral ectoparamere with clearly wider and obtuse (almost rounded) distal part of posteromedial hook of proximal sclerite (Fig. X: 25), right apical lobule of rachis similar to left one in length and almost lacking hook at apex, left apical lobule of rachis with sclerotized part rather narrow but widened near apex, and rachial area between bases of these lobules without distinct asymmetrical sclerotization (Figs X: 27, 28).

Variations. Some specimens with marks on head above eyes and on fourth abdominal tergite almost indistinct, brownish stripes on eighth and ninth tergites somewhat wider than in holotype, hind tibia with 3–4 outer dorsal spines, and genital plate with slightly longer (than in holotype) apical lobules (Fig. X: 23).

Female. Colouration and structure of body almost as in males, but body smaller, metanotum sometimes with brownish line along posterior edge, legs with lighter fore and middle tibiae (most part of these tibiae light) as well as with 4–6 inner dorsal spines on hind tibia, and structure of abdominal apex practically indistinguishable from that of *E. d. dilutus* **subsp. nov.**.

Length in mm. Body: male 8.5–9.2, female 6.5–7.8; pronotum: male 1.9–2.2, female 1.6–1.8; fore femur: male 3.1–3.4, female 2.9–3.2; fore tibia: male 3–3.3, female 2.9–3.1; middle femur: male 3–3.2, female 2.8–3; middle tibia: male 3.4–3.7, female 2.9–3.3; hind femur: male 6–6.5, female 5.4–5.8; hind tibia: male 7.3–7.8, female 5.7–6.1; hind basitarsus: male 2.2–2.4, female 1.9–2.1; ovipositor 3.4–3.6.

Comparison. The new subspecies clearly differs from *E. d. dilutus* **subsp. nov.** in the male genitalia with the wider and characteristically rounded distal part of posteromedial hook of each ventral ectoparamere. From the other true and possible congeners, *E. d. bakhtiyari* **subsp. nov.** is distinguished by the same characters as *E. d. dilutus* **subsp. nov**.

Etymology. The new subspecies is named after Bakhtiyari, a people tribe distributed mainly in the Khuzestan Province where this subspecies was collected.

Remark. This subspecies, judging by its colouration, is probably a semiobligatory inhabitant of caves with a narrow area. But possibly it is a separated species closely related to *D. dilutus* **sp. nov**.

Eremogryllodes bifurcatus
Tahami et Gorochov, **sp. nov.**
(Figs IX: 5, 6; X: 29–36; XI: 1)

Holotype. Male, **Iran**, *Lorestan Prov*., Khoram Abad County, Pirmorad Vill., 33˚43´N, 48˚26´E, Pirmorad Cave, 21.X.2016, M. Tahami (ZM-CBSU).

Paratypes. **Iran**: 1 male, 1 female, 1 nymph of male and 2 nymphs of females, same data as for holotype (ZM-CBSU); 4 males and 2 nymphs of females, *Lorestan Prov*., Khoram Abad County, Absarde Vill., 33˚47´N, 48˚37´E, Tang-e Lor Cave, 21.X.2016, M. Tahami (ZM-CBSU and ZIN); 1 male and 1 female nymph, *Lorestan Prov*., Kuhdasht County, Ghor Alivand Vill., 33˚25´N, 47˚46´E, Botkhane Cave, 19.X.2016, M. Tahami (ZM-CBSU); 1 male and 4 females, *Kermanshah Prov*., 5 km before Kerend Town, 34˚15´N, 46˚17´E, Kerend Cave, 16.X.2016, M. Tahami, M. Shahabi (ZM-CBSU); 1 male, *Kermanshah Prov*., Kermanshah County, Darshademan Vill., 34˚41´N, 46˚52´E, Gelim Goosh Cave, 17.X.2016, M. Tahami (ZM-CBSU); 1 male and 4 nymphs of females, *Ilam Prov*., Zarneh County, 33˚56´N, 46˚11´E, Zarneh Cave, 25.X.2015, H. Darvishniya (ZM-CBSU).

Description. Male (holotype). Body slightly smaller than in previous Iranian congeners. Colouration whitish with following marks: head with eyes coloured as in *E. dilutus* **sp. nov.** and almost without darkened marks above them; pronotum with rather wide greyish brown band on dorsal half along anterior edge (this band having light narrow median stripe) and two pairs of barely lighter spots along posterior edge (lateral and medial spots connected with each other narrow darkened stripe along posterior edge of disc); metanotum and three anterior abdominal tergites with five spots (a pair of lateral spots almost greyish brown; median spot and a pair of medial spots light brown, but latter spots located near lateral ones); fourth and fifth abdominal tergites with three small light brown marks; eighth and ninth abdominal tergites brownish in dorsal part; last tergite with a pair of small darkish marks; epiproct with a pair of similar marks; each paraproct with similar longitudinal stripe also; cerci with darkish stripes along inner and outer surfaces (Figs X: 30; XI: 1); legs similar to those of previous Iranian congeners in colouration, but most part of fore and middle tibiae light. Structure of body also similar to that of these species; however, hind tibiae with five outer and seven inner dorsal spines (one distal and one subproximal outer spines as well as one subdistal and four proximal inner spines shorter than other dorsal spines of this tibia), genital plate as in representatives of these species having apical lobules angularly elongated (Fig. X: 29), and genitalia with V-shaped endoparameral sclerites having rather narrow and long as well as clearly arcuate anterior projection (Fig. X: 31), with each ventral ectoparamere having posteromedial hook of proximal sclerite short and bifurcated (both tubercles of this hook more or less conical and directed to different sides: proximal tubercle directed medially and slightly upwards, but distal tubercle, backwards/downwards; Figs X: 33, 34), and with rachis having almost lancet-like left apical lobule and clearly asymmetrical and shorter right apical lobule (Figs X: 35, 36).

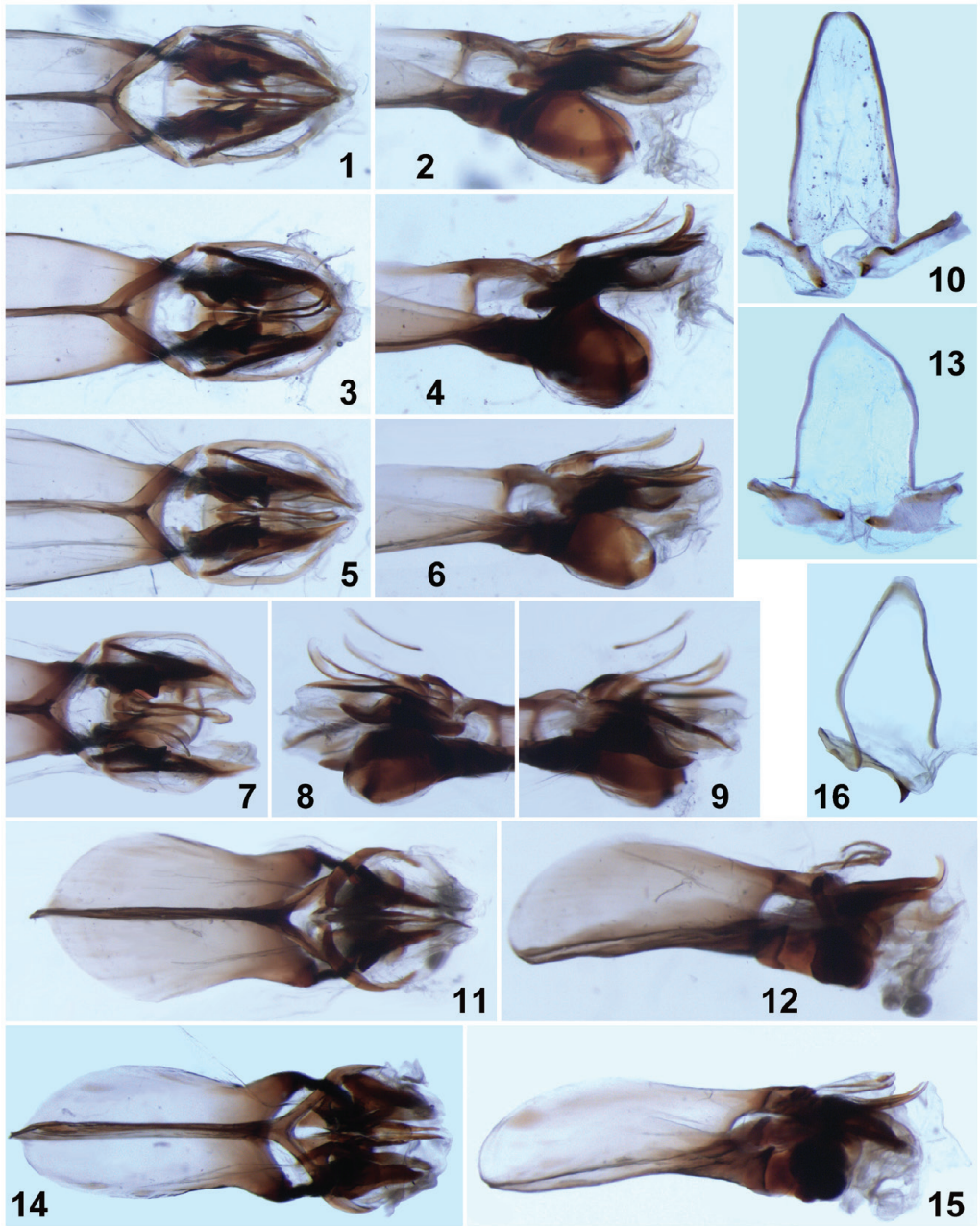
Variations. Some specimens barely lighter (with anterior darkened band on pronotum divided into four brownish spots and almost without darkenings on other tergites); number of dorsal spines on hind tibia somewhat varied (4–5 on outer side and 5–7 on inner one); genital plate with apical lobules sometimes less elongated than in holotype.

Female. General appearance as in males, but darkened marks on abdominal tergites usually somewhat more distinct (especially on last tergite), darkened spots on epiproct and paraprocts often slightly or distinctly larger, most part of fore and middle tibiae often darkish, hind femur sometimes with additional barely darkened dorsolateral area located not far from its distal darkening, hind tibia with four outer and 5–6 inner dorsal spines, genital plate barely notched at apex (this notch widely rounded), and rest of abdominal apex almost as in females of previous Iranian congeners.

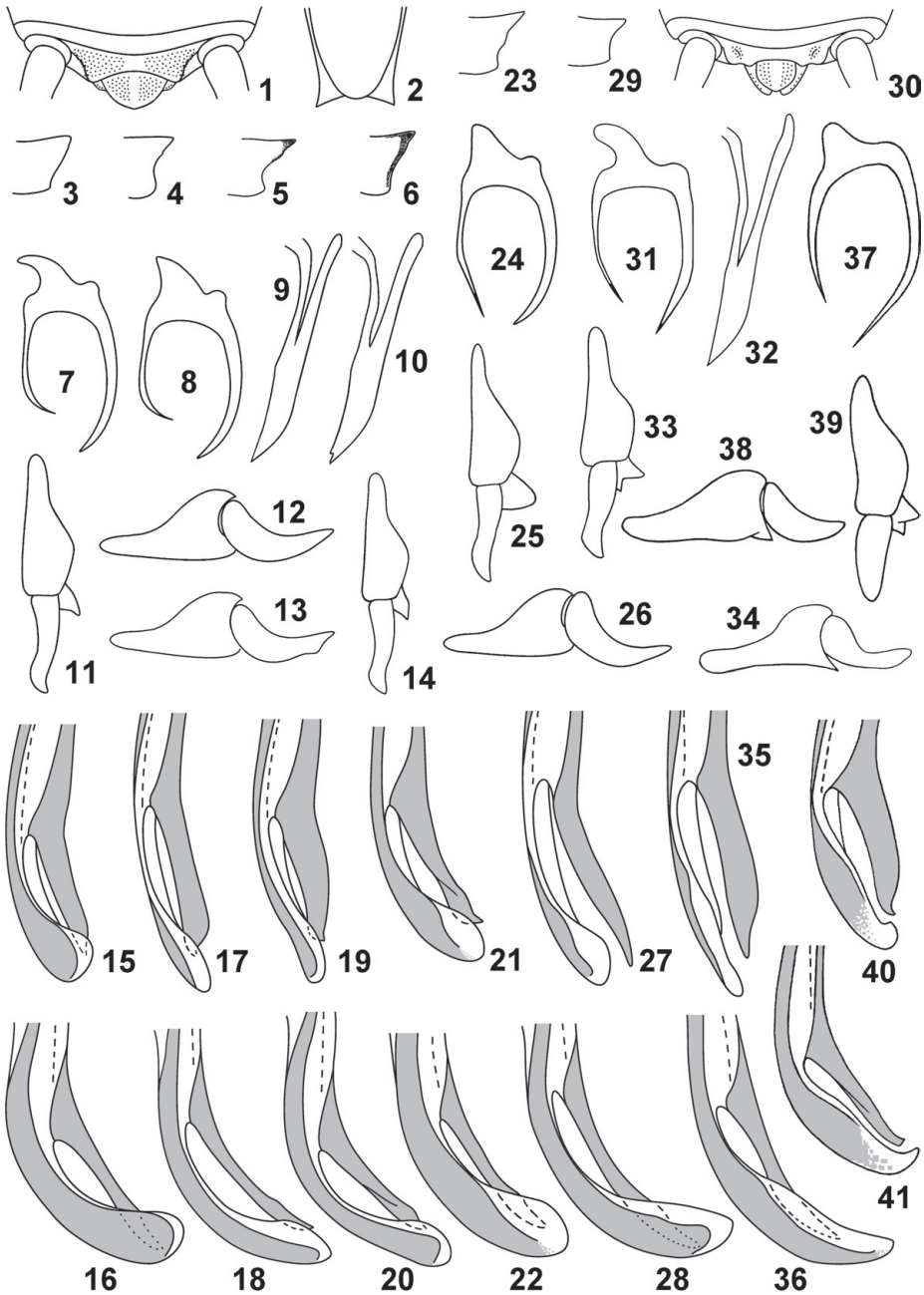
Length in mm. Body: male 7.5–8.6, female 6.3–7.5; pronotum: male 1.6–1.9, female 1.5–1.7; fore femur: male 2.8–3.2, female 2.5–2.9; fore tibia: male 2.7–3.1, female 2.4–2.9; middle femur: male 2.8–3.2, female 2.4–2.8; middle tibia: male 2.8–3.1, female 2.5–2.9; hind femur: male 5.2–5.7, female 4.8–5.2; hind tibia: male 5.3–5.8, female 5–5.4; hind basitarsus: male 1.9–2.1, female 1.6–1.8; ovipositor 2.9–3.1.

Comparison. The new species distinctly differs from *E. iranicus* **sp. nov.**, *E. persicus* **sp. nov.**, and *E. dilutus* **sp. nov.** in the distal part of posteromedial hook of each ventral ectoparamere bifurcated (i.e. with two angular apical tubercles). From *E. major* and *E. monodi*, it is distinguished by the presence of this hook as well as characteristic shape of V-shaped endoparameral sclerites, and from all the other possible congeners by the same characters as the three abovementioned Iranian species.

Etymology. Name of the new species is the Latin word "bifurcatus" (bifurcate)



Figs IX (1–16). *Eremogryllodes* and *Bothriophylax*, male. **1, 2**, *E. dilutus* **sp. nov.** (Balezar Cave); **3, 4**, *E. d. bakhtiyari* **subsp. nov.** (holotype); **5, 6**, *E. bifurcatus* **sp. nov.** (holotype); **7–10**, *E. b. turcicus* **subsp. nov.**; **11–13**, *B. kiritshenkoi* **sp. nov.** (holotype); **14–16**, *B. rjabovi* **sp. nov.** Genitalia without epiphallus and most part of endoparameral apodeme (1–9) as well as only without epiphallus (11, 12, 14, 15) from above (1, 3, 5, 7, 11, 14) and from side (2, 4, 6, 8, 9, 12, 15); epiphallus with both posterolateral sclerites (10, 13) and with only left one (16) from above.



Figs X (1–41). *Eremogryllodes*, male. **1–22**, *E. dilutus* **sp. nov.** (1–3, 7, 15, 16, Pebdeh Cave; 4, 8, 9, 11, 12, 17, 18, holotype; 5, 13, Deh Sheykh Cave; 6, 21, 22, Balezar Cave; 10, 19, 20, Ab Konardoun Cave; 14, Ker Palang Cave); **23–28**, *E. d. bakhtiyari* **subsp. nov.** (holotype); **29–36**, *E. bifurcatus* **sp. nov.** (holotype); **37–41**, *E. b. turcicus* **subsp. nov.** Abdominal apex from above (1, 30); distal part of genital plate from above (2) and from side (3–6, 23, 29); right V-shaped endoparameral sclerite from above (7, 8, 24, 31, 37); right dorsal ectoparamere from above (9, 10, 32); left ventral ectoparamere from above (11, 14, 25, 33, 39) and from side (12, 13, 26, 34, 38); distal part of rachis from more or less above (15, 17, 19, 21, 27, 35, 40) and from side (16, 18, 20, 22, 28, 36, 41), non-membranous parts painted in grey.

given in connection with the shape of posteromedial hooks of ventral ectoparameres in its male genitalia.

Remark. Rather light colouration (with slightly darkened spots) of this species supposes that it is a semiobligatory inhabitant of caves. Its autapomorphy is the posteromedial hook of ventral ectoparamere with a distinct bifurcation at the apex, but this species has this hook short (a possible symplesiomorphy with *E. dilutus* **sp. nov.**), its right rachial lobule is not desclerotized (a probable symplesiomorphy with *E. dilutus* **sp. nov.** and *E. persicus* **sp. nov.**), and the development of the above-mentioned hook in *E. bifurcatus* **sp. nov.** is a synapomorphy with *E. dilutus* **sp. nov.**, *E. persicus* **sp. nov.** and *E. iranicus* **sp. nov.** at least in relation to *E. major* and *E. monodi*.

Eremogryllodes bifurcatus turcicus Gorochov et Ünal, **subsp. nov.** (Figs IX: 7–10; X: 37–41; XI: 2–5)

Holotype. Male, **Turkey**, "Hakkari, Çukurca", 37°14′32′′N, 43°36′34′′E, 1290 m, 4.VI.2013, M. Nabozhenko, S. Nabozhenko, B. Keskin, A. Pertaş (ZIN).

Description. Male (holotype). General appearance very similar to that of nominotypical subspecies but with following differences: body somewhat smaller (small for this genus); head with small reversed V-shaped brownish mark on rostrum between antennal cavities; pronotum with brownish band along anterior edge as in holotype of *E. b. bifurcatus* **subsp. nov.** but slightly lighter and narrower, and with brownish spots along posterior edge also somewhat smaller and significantly lighter (barely visible); other tergites almost uniformly light; darkish spots on epiproct and paraprocts also barely visible; most part of fore and middle tibia light (Figs XI: 2–5); hind tibia with four outer and four inner dorsal spines (distal outer spine and subdistal inner one shorter than other dorsal spines of this tibia); genital plate with apical lobules moderately elongate (almost as in males of *E. b. bifurcatus* **subsp. nov.** with these lobules shortest). Genitalia (Figs IX: 7–10) also most similar to those of *E. b. bifurcatus* **subsp. nov.**, but V-shaped endoparameral sclerites with distinctly shorter and not arcuate anterior projection (Fig. X: 37), and ectoparameres and rachis as in Figs X: 38–41.

Female unknown.

Length in mm. Body 5.3; pronotum 1.5; fore femora 2.6; fore tibiae 2.3; middle femora 2.5; middle tibiae 2.5; hind femora 4.4; hind tibiae 4.6; hind basitarsus 1.7.

Comparison. The new subspecies is distinguished from nominotypical one by the body smaller, endoparameral sclerites having the clearly shorter and not arcuate anterior projections, and rachis with the apex of left apical lobule distinctly more hooked (for comparison see Figs X: 31, 36 and 37, 41). From all the other true and possible congeners, it is differs in the same characters as *E. b. bifurcatus* **subsp. nov**.

Etymology. The new subspecies is named after the Turkey Country where it was collected.

Remark. It is the first record of Bothriophylacinae from Turkey.

Eremogryllodes major Chopard, 1960 (Figs I: 5–7; III: 8, 9; IV: 13–22; XII: 16)

Holotype. Male, **Afghanistan**, "Muséum Paris, Afghanistan, Caverne á Qual eh Malik, Lindberg, 6.1.58", "Type", "*Eremogryllodes major* L. Chopard det., type" (MNHN).

Paratype. Female, **Afghanistan**, "Muséum Paris, Afghanistan, Grotte des Kouh-Chigui, Lindberg, 30.1.58", "*Eremogryllodes major* L. Chopard det., allotype" (MNHN).

Redescription. Male (holotype). Size, colouration and structure of body similar to those of holotype of *E. iranicus* **sp. nov.** but with following differences: head with small darkened areas under eyes and slightly different darkish marks between antennal cavities (Figs I: 5, 6); pronotum with distinctly smaller darkened medial spots along anterior edge (Figs I: 6, 7); legs with darkish area on middle part of hind femur divided

into four spots (rather large longitudinal spots on dorsal half of outer surface and on ventral halves of outer and inner surfaces, and smaller longitudinal median stripe on inner surface), and with rather dark median line on proximal two thirds of dorsal surface of hind tibia; rest of tergites almost uniformly light, but small lateral portions of widened (protruding) part of tenth abdominal tergite as well as lateral parts of epiproct and medial parts of cerci darkish (Fig. III: 8); distance between antennal cavities approximately 2 times as great as width of this cavity; hind tibia with inner proximal spine almost equal to majority of other spines of this tibia in length; genital plate slightly longer and with convex apical part located between a pair of almost spine-like subapical projections (Figs III: 9; XII: 16); genitalia distinguished from those of *E. iranicus* **sp. nov.** and other known Iranian and Turkish congeners by V-shaped endoparameral sclerite with less transverse anterior part, wider and shorter dorsal ectoparameres, shorter and higher distal sclerite of ventral ectoparameres, lower proximal sclerite of these ectoparameres having longer anterior apodeme and lacking distinct posteromedial hook, somewhat different shape of a pair of sclerotized longitudinal ribbons in rachis (Figs IV: 13–22), and from those of *E. monodi*, by longer medial branch of V-shaped endoparameral sclerites, different shape of basal part of these sclerites (for comparison see Figs IV: 6, 7 and 16, 17), absence of a pair of narrow additional sclerites between V-shaped sclerites, distal sclerite of ventral ectoparameres slightly shorter and with higher proximal part (Figs IV: 4, 5 and 14, 15), and sacculus with wider membranous area on its left half and without any longitudinal membranous area on dorsolateral part of its right half (Figs IV: 8–12 and 18–22).

Female. General appearance as in male, but body slightly smaller, head and pronotum with slightly darker marks, legs also with darker marks and dark most part of dorsal surface of hind tibia, other tergites with transverse darkish stripe along posterior edge, and epiproct almost completely darkened; genital plate short and rounded; ovipositor almost indistinguishable from that of *E. iranicus* **sp. nov.**.

Length in mm. Body: male 8.5, female 5.5; pronotum: male 2, female 1.8; hind femora: male 6.5, female 5; ovipositor 3.3.

Remark. Holotype and paratype of *E. major* originate from different caves, and they are not identical in the colouraton. It is a reason that we cannot exclude that the above-mentioned female belongs to another species of this genus.

Eremogryllodes monodi Chopard, 1929
(Figs I: 1–4; II: 4; III: 10–12; IV: 1–12)

Holotype (?). Male, **Algeria**, "Museum Paris, Mission Saharienne Augérias, Draper, Th. Monod, 1928", "Type", "*Eremogryllodes monodi* Chop., type, L. Chopard det." (MNHN).

Redescription. Male (possible holotype). Size, colouration and shape of body also similar to those of holotype of *E. iranicus* **sp. nov.** but distinguished by following characters: head with dorsum and posterolateral parts of genae light brown but having darker stripes above eyes as in this species, darkened areas under eyes and slightly different darkish marks between antennal cavities (Figs I: 2, 3); pronotum with very large light brown area, a pair of barely darker spots on middle part of disc, brown transverse band along anterior edge, and four brown spots in posterior part fused with each other along posterior edge (Figs I: 3, 4); other tergites (except for last one) also partly light brown with a few darker marks; legs with less large darkish area in middle part of outer surface of hind femur, and with light tibiae having darkened longitudinal stripe on outer surface of proximal half of hind tibia; last abdominal tergite, epiproct and paraprocts almost completely light; cerci with darkened longitudinal stripe on inner surface (Fig. III: 10); eyes slightly wider (Figs I: 2, 3); distance between antennal cavities barely more than twice greater than width of this

cavity; pronotum less transverse (Fig. I: 4); hind tibia with proximal spines similar to those of *E. major*; hind edge of tenth abdominal tergite strongly concave in median part; epiproct roundly truncated posteriorly, with barely distinct posteromedian notch and uneven relief of dorsum (Fig. III: 10); genital plate with narrow (almost narrowly truncated) posteromedian projection having a pair of ventrolateral spinules, and with a pair of short rectangular subapical lobules (Figs III: 11, 12); genitalia (Figs IV: 1–12) distinguished from those of *E. iranicus* **sp. nov.** by characters listed in "comparison" after description of this new species, and from *E. major* by features listed in redescription of latter species (see above).

Female. Some its characters (Fig. I: 1) listed by Chopard (1943: fig. 350).

Length in mm (partly after Chopard, 1929, 1943). Body 6–8.2 (possible holotype 8.2); pronotum, possible holotype 1.7; hind femora 4.2–4.8 (possible holotype 4.8); ovipositor 3.6.

Remark. Chopard (1929, 1934) indicated type data of this species originally as "1 male, Hoggar, 30-x-27 (Monod)" and later as "Atakor-n-Ahaggar, 30-X-27, 1 male (Monod)". Thus, we cannot exclude that the male studied has been incorrectly designated as "type" of this species.

Eremogryllodes? sp.

Material. One nymph of male, **Pakistan**, *Peshavar*, Forestry Campus of Agricultural University, 14–26.VIII.2005, S. Ovchinnikov (ZIN).

Note. This genus is provisionally recorded from Pakistan for the first time. Simultaneously, this indication is also a first record of the subfamily Bothriophylacinae from Pakistan. The nymph is similar to the representatives of *Eremogryllodes* from Iran, Turkey and Afghanistan in the general appearance but with following peculiarities: its body is almost whitish with the eyes as in the latter representatives, rostrum having a small darkish median spot near the clypeus, pronotum having a pair of anterior and a pair of posterior rather small light brown spots, and legs having slightly darkened areas similar to those of these species but somewhat smaller; its hind tibia has five inner and four outer dorsal spines.

Bothriophylax kiritshenkoi
Gorochov et Tahami, **sp. nov.**
(Figs IX: 11–13; XI: 9–12; XII: 1–6)

Holotype. Male, **Iran**, *Semnan Prov.*, "Persia sept.-or., Shachrud [= Shahrud or Shahrood, town]", 14.V.1914, A. Kiritshenko (ZIN).

Paratypes. Two males, 2 nymphs of males and 1 nymph of female, same data as for holotype but 14–28.V.1914 (ZIN and ZM-CBSU).

Description. Male (holotype). Body typical of this genus in general appearance (Fig. XI: 9). Colouration whitish yellow with following marks: head with clypeus and apical segment pf maxillary palpi having slight reddish tinge as well as with dark brown eyes having dorsoposterior third (lacking facets) light brown; pronotum with three rather large brown spots along anterior edge and with four short brown spots along posterior edge (i.e. colouration of pronotum more or less similar to that of *B. semenovi* and *B. arab*: for comparison see Figs I: 14, 15; XI: 10, 11); mesonotum with small light brown (barely visible) median spot; metanotum and two anterior abdominal tergites with three light brown but more distinct spots (each of these tergites with rather small median spot and a pair of similar dorsolateral spots, but metanotum also with a pair of additional light brown ventrolateral marks); legs with only two slight (poorly visible) darkenings on proximal half of dorsal surface of hind tibia (Figs XI: 9, 12). Head with eyes similar to those of other representatives of Bothriophylacini previously described here, with palpi similar to those pictured in Fig. V: 10 (but subapical segment of maxillary palpus slightly longer), and with rostrum between antennal cavities approximately 1.7 times as wide as this cavity. Pronotum moderately transverse, slightly narrowing to head, rather high, with straight (horizontal) ventral edge of each lateral lobe having widely

rounded anteroventral and almost rectangular posteroventral corners (Figs XI: 10, 11); other tergites dorsally similar to pronotum but clearly shorter and not narrowing in anterior part, but last tergite approximately as in representatives of Bothriophylacini previously considered here (Fig. XI: 9). Legs also almost as in these species, but hind tibia with four outer and four inner dorsal spines (distal outer spine and subdistal inner one shorter than other dorsal spines of this tibia), hind basitarsus with only one subapical spinule, and all claws approximately as in *B. semenovi* (Fig. II: 3) in length. Epiproct and paraprocts also similar to those of these species, but epiproct somewhat shorter and more widely rounded at apex; genital plate rather short, narrowing to apex, with rather deep and rounded posteromedian notch as well as with angular dorsolateral lobules directed backwards/downwards and having oblique fold-like concavities at base (Figs XII: 1, 2); genitalia more or less similar to those of *B. vlasovi*, *B. semenovi* and *B. arab*, but V-shaped endoparameral sclerite with medial branch not isolated from its base and with this base rather narrow (short) (see Figs IV: 25; XII: 3), dorsal ectoparameral sclerite with narrow anterolateral projection (see Figs IV: 26; XII: 4), ventral ectoparameral sclerite slightly or distinctly larger than in latter congeners (see Figs IV: 27, 30; XII: 5), and rachis less sclerotized dorsally than in *B. vlasovi* and *B. semenovi* and with distal part clearly curved upwards and laterally flattened (i.e. almost vertically lamellar) as well as without any dorsal denticle (see Figs IV: 26, 27, 29, 30, 31; XII: 4–6, 15).

Variations. One male with epicranium having small brown mark under each eye (near its ventral edge), with pronotum having anteromedian brown spot clearly wider than in holotype, with third abdominal tergite painted as first and second ones, and with last tergite slightly darkened dorsally; other male with unclear darkish area on head between eyes and with slight brownish subapical mark on each (outer and inner) surface of hind femur.

Female unknown.

Length in mm. Body 4.5–6; pronotum 1.3–1.6; fore femur 2–2.6; fore tibia 1.9–2.4; middle femur 1.9–2.1; middle tibia 1.8–2; hind femur 4–5; hind tibia 4.2–5.5; hind basitarsus 1.8–2.3.

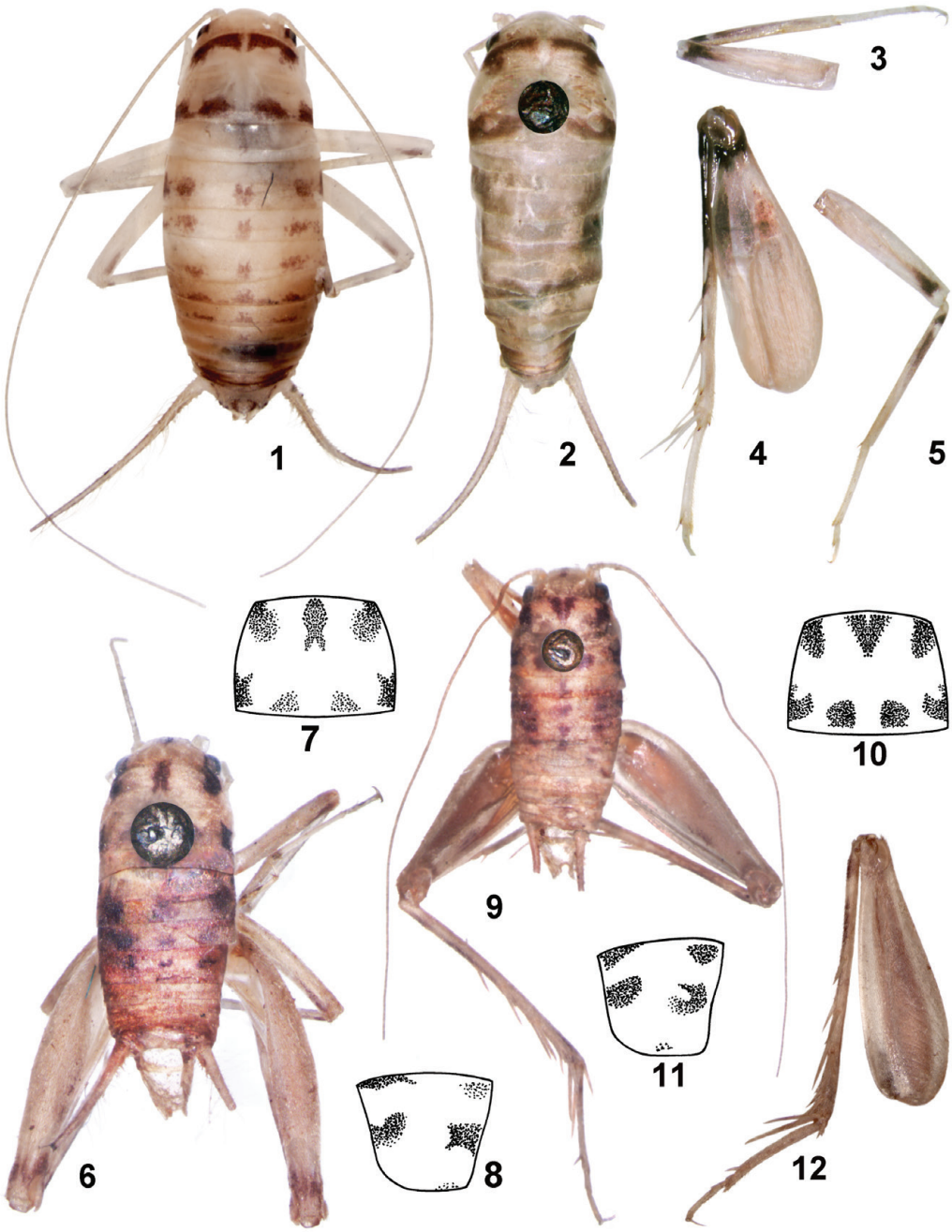
Comparison. The new species is most similar to *B. vlasovi* and *B. semenovi* in the structure of V-shaped endoparameral sclerites, but it is distinguished from them by the following features of the male genitalia: dorsal ectoparameral sclerite are with the clearly narrower anterolateral projections; rachis is less sclerotized dorsally and with the distal part more strongly curved upwards and flattened laterally (in *B. vlasovi* and *B. semenovi*, this part of rachis is more straight, almost tubular and somewhat twisted). From *B. vlasovi* and *B.? uvarovi*, the new species differs in the distinctly shorter tarsal claws; from *B. arab*, in the shape of male genital plate (for comparison see Figs XII: 1, 2 and 13, 14), V-shaped endoparameral sclerite with the medial branch not isolated from its base, this base distinctly shorter (narrower), and rachis strongly curved upwards and almost lamellar in its distal part; and from *E.? pallidus* and *E.? fiorii*, in the armament of hind legs: hind tibia of *B. kirichenkoi* **sp. nov.** has four inner and four outer dorsal spines, but this tibia in *E.? pallidus* and *E.? fiorii* has three outer and two inner dorsal spines. Differences between *B. kiritshenkoi* **sp. nov.** and *B.? richteri* (another Iranian species probably belonging to this genus) are listed below, in the latter species redescription.

Etymology. The new species is named in honor of its collector, entomologist A.N. Kiritshenko.

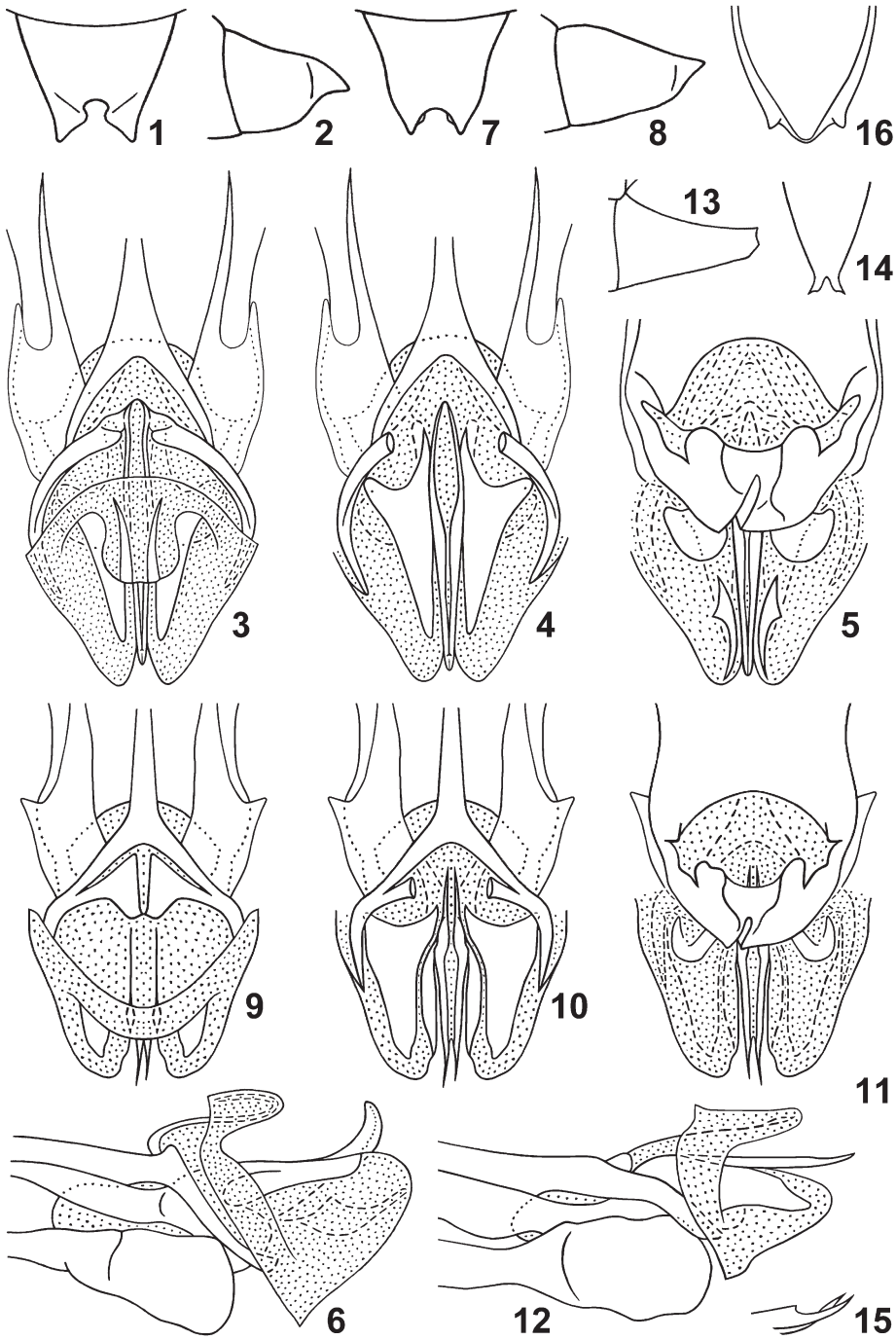
Bothriophylax? richteri (Chopard, 1959) (Figs I: 8–10)

Eremogryllodes richerti Chopard, 1959, lapsus calami (see Gorochov, 2014).

Holotype. Female, **Iran**, *Sistan and Baluchestan Prov.*, "Iran (Makran) am Kahuran bei Putab 25.III.1954 Richter u. Sehäuffele", "*Eremogryl-*



Figs XI (1–12). *Eremogryllodes* and *Bothriophylax*, male. **1**, *E. bifurcatus* **sp. nov.** (holotype); **2–5**, *E. b. turcicus* **subsp. nov.**; **6–8**, *B. rjabovi* **sp. nov.**; **9–12**, *B. kiritshenkoi* **sp. nov.** (holotype). Body from above, some or all legs absent (1, 2, 6, 9); outer side of fore (3), hind (4, 12) and middle (5) legs; pronotum from above (7, 10) and from side (8, 11).



Figs XII (1–16). *Bothriophylax* and *Eremogryllodes*, male. **1–6**, *B. kiritshenkoi* **sp. nov.** (holotype); **7–12**, *B. rjabovi* **sp. nov.**; **13–15**, *B. arab* Gor.; **16**, *E. major* Chop. Genital plate (1, 2, 7, 8, 13) and its distal half (14, 16) from below (1, 7, 14), from side (2, 8, 13) and from above (16); genitalia without both anterior part and epiphallus from above (3, 9), from below (5, 11), from side (6, 12), and from above but additionally without median part of membranous endoparameral fold carrying narrow medial branches of V-shaped endoparameral sclerites (4, 10); distal half of rachis from side (15).

lodes richteri Type L. Chopard det.", "Typus Nr.", "Type" (SMNS).

Additional material. One female, same data as for holotype but with label "Paratypoid" instead labels "Typus Nr." and "Type" (SMNS).

Redescription. Female (holotype). General appearance more or less similar to that of *B. kiritshenkoi* **sp. nov.**, *B. semenovi* and *B. arab* but with some characteristic features. Body small; colouration whitish yellow without darkened spots on head (except for small darkish marks on ventrolateral parts of scapes and for eyes painted as in these species), with seven light brown spots on pronotum which partly different from those of above-listed congeners (anteromedian spot narrow, and a pair of posteromedial spots long, narrow and fused with each other and with previous spot in central part of disc; Figs I: 8–10), and almost without darkenings on rest of body. Structure of head, thorax and its appendices also similar to that of these congeners, but armament of hind leg slightly different: tibia with three (but not four) outer dorsal spines, four inner dorsal spines (outer distal spine and inner subdistal one clearly shorter than other spines of this tibia) and six apical spurs; hind basitarsus with two distal spinules on dorsal surface (but outer spinule very short). Structure of abdomen almost indistinguishable from that of *B. semenovi* and *B. vlasovi* (Fig. V: 4, 5).

Variations. Second female with scapes completely light.

Length in mm. Body 4–5.5; pronotum 1.2–1.3; hind femur 3.4; ovipositor 2.4–2.5.

Remark. This species was described from a single holotype (Chopard, 1959); thus, the second female does not belong to its type series. This species differs from its congeners with seven darkened pronotal spots (*B. semenovi*, *B. kiritshenkoi* **sp. nov.**, *B. arab*) in the shape of these spots (for comparison see Figs I: 9, 10, 14, 15; XI: 10, 11); from *B. semenovi* and *B. kiritshenkoi* **sp. nov.** (additionally), in the hind tibia having three outer dorsal spines instead four ones; from *B. vlasovi* and *B.? uvarovi*, in the armament of hind tibia (*B. vlasovi* has four outer dorsal spines instead three ones; *B.? uvarovi* has three inner dorsal spines instead four ones) and shorter tarsal claws; from *B. vlasovi* (additionally), in the pronotal darkened spots more numerous (seven instead three; Figs I: 10, 11, 13); and from *E.? pallidus* and *E.? fiorii*, in the hind tibia with four (but not two) inner dorsal spines.

Bothriophylax rjabovi Gorochov, **sp. nov.** (Figs IX: 14–16; XI: 6–8; XII: 7–12)

Holotype. Male, **Armenia**, *Syunik Prov.*, Aras [= Arax] River Valley, Nrnadzor [= Nyuvadi] Vill. not far from Meghri Town, 1.IX.1932, M. Rjabov (ZIN).

Description. Male (holotype). General appearance similar to that of holotype of *B. kiritshenkoi* **sp. nov.** but with following differences: body colouration with additional brown median stripe running from clypeus to area between posterior parts of eyes, with anteromedian brown spot on pronotum clearly narrower, with darkenings on abdominal tergites almost as in one of *B. kiritshenkoi* **sp. nov.** paratypes, and with hind legs having rather distinct brownish grey subapical areas on femur and clearly darkened most part of dorsal surface of tibia (Figs XI: 6–8); armament of legs also as in this species but most proximal spine of one hind tibia approximately 1.5 times as long as that of other hind tibia (i.e. one of them somewhat shortened); genital plate with slightly shorter and less sinuate posterolateral lobules directed almost backwards / upwards, and with posteromedian notch somewhat less deep (Figs XII: 7, 8). Genitalia most similar to those of *B. arab*, but epiphallus with apical hooks (tubercles) slightly longer and narrower (Fig. IX: 16), V-shaped endoparameral sclerite with medial branch having its base wider (longer) and thickened apical part shorter, dorsal ectoparameral sclerite somewhat wider in middle part, and rachis without distinct tubercles or denticles on dorsal edge of both (left and right) sclerotized rachial ribbons (for comparison see Figs IV: 30, 31; IX: 14, 15; XII: 9–12, 15).

Female unknown.

Length in mm. Body 5.2; pronotum 1.3; fore femur 2.2; fore tibia 2.1; middle femur 2.3; middle tibia 2.2; hind femur 4.2; hind tibia 4.4.

Comparison. The new species is most similar and closely related to *B. arab*, but it is clearly distinguished from the latter species by the shape of male genital plate (for comparison see Figs XII: 7, 8 and 13, 14) and the above-listed characters of male genitalia (especially by the rachis lacking dorsal tubercles; in *B. arab*, right sclerotized rachial ribbon has an angular dorsal tubercle not fat from the apex). From *B. kiritshenkoi* **sp. nov.**, *B rjabovi* **sp. nov.** differs in some features of the male genital plate (see Figs XII: 1, 2 and 7, 8) as well as in the following characters of male genitalia: posterolateral epiphallic sclerites are narrower in the proximal half; medial branch of V-shaped endoparameral sclerite is interrupted and with the widened base; dorsal ectoparameral sclerite have the wider distal parts; ventral ectoparameral sclerite are presented by the narrower sclerotized parts; rachis is not flattened laterally and not strongly curved upwards. From *B. vlasovi* and *B. semenovi*, the new species is distinguished by the different shape of dorsal ectoparameral sclerites (see Figs IV: 26; XII: 10), by the rachis not almost completely sclerotized but having a pair of narrow sclerotized ribbons, and by the rachial distal part not twisted (see Figs IV: 26, 27, 29; XII: 10–12); from *B.? richteri*, in the pronotum having the posterolateral darkened spots distinctly shorter and not fused with each other and with the anteromedian darkened spot in the central part of pronotal disc (see Figs I: 10; XI: 7), and in the hind tibia having four (but not three) dorsal spines on the outer side; and from *B.? uvarovi*, *E.? pallidus* and *E.? fiorii*, in the same characters as *B. kiritshenkoi* **sp. nov**.

Etymology. The new species is named in honor of its collector, entomologist M.A. Rjabov.

Remark. This specimen was mistakenly identified by Gorochov (1984b) as "*Eremogryllodes semenovi* (Miram)".

Bothriophylax? sp.

Material. One female, **Pakistan**, *Baluchistan*, 10 km W of Kach Vill., 30°25´N, 67°16´E, 28.VII.2005, S. Ovchinnikov (ZIN).

Note. This genus is provisionally recorded from Pakistan for the first time. The female studied is similar to *B. semenovi*, *B. kiritshenkoi* **sp. nov.**, *B. rjabovi* **sp. nov.** and *B. arab* in the general appearance (especially in the shape and number of darkened spots on the pronotum), but its head has a rather large brown median longitudinal spot on the rostrum, and its hind tibia is with the four inner and four outer dorsal spines (i.e. armament of this tibia is as in the three first species). Possibly, this specimen belongs to a new species, but its description on the base of only female is premature.

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